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ON THE

GEOLOGY AND ZOOLOGY OF ABYSSINIA.

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OBSERVATIONS

J. C. Branner

ON THE

GEOLOGY AND ZOOLOGY

OF

ABYSSINIA,

MADE DURING THE PROGRESS OF THE BRITISH EXPEDITION TO THAT COUNTRY IN 1867-68.

BY

W. T. BLANFORD,

Associate of the Royal School of Mines; Fellow of the Geological Society of London;
Corresponding Member of the Zoological Society of London, and of the Isis, Dresden;
Deputy Superintendent of the Geological Survey of India;
LATE GEOLOGIST TO THE ABYSSINIAN EXPEDITION.

WITH ILLUSTRATIONS AND GEOLOGICAL MAP.

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PREFACE

THE present work contains an account of the Geological and Zoological Observations made by the author in Abyssinia, when accompanying the British army on its march to Magdala and back in 1868, and during a short journey in Northern Abyssinia, after the departure of the troops.

The book is divided into three parts. The first of these contains a brief description of the journey, and of some of the principal Geological and Zoological features of the countries visited. The second part is devoted to Geology; it comprises a brief notice of the observations made by previous explorers, a general account of the formations examined, and a few remarks on the geological configuration of the country. The third part contains the Zoological observations, and consists of an enumeration of the various animals collected, with remarks on their habits, distribution, &c., preceded by a short account of the principal works on Abyssinian Zoology hitherto published, and some brief observations on the relations and distribution of the Abyssinian fauna. A few species of Vertebrata which appear to have escaped the researches of previous explorers are described and figured.

In the map compiled by Messrs. Stanford and Co. which accompanies the Geological part, an attempt has been made to represent the physical features of the Abyssinian highlands in a more definite manner than has previously been done, and to distinguish between the great eastern scarp of the plateau and the minor irregularities of its surface.[1]

Although the time spent in Africa by the author was only eight months, the advantages which he enjoyed in consequence of being especially deputed by the Indian Government enabled him to make a considerable series of observations in both the branches of science to which his attention was directed, and to obtain a valuable collection, comprising more than 1,600 specimens of Vertebrata alone, representing about 360 species, besides Mollusca, and a few Articulata.

The time which has elapsed since his return from Abyssinia to India in September 1868, has been principally devoted to the examination and comparison of these collections. The Government of India has not only most liberally relieved him from his duties on the Geological Survey, in order to enable him to prepare the present work, but has also permitted him to complete the same in England, in order to afford him access to the museums and libraries of Europe.

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[1] This has been done at the suggestion of Mr. Trelawny Saunders, and in a great measure by his aid.

The Government of Bombay, under whose orders the writer was acting whilst in Abyssinia, and for some time subsequently, has also afforded him every facility and aid.

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PERSONAL NARRATIVE.

I LEFT Bombay harbour for Abyssinia on the 4th of December, 1867, in the good ship *Bucentaur*, Captain Babot, one of the large fleet of transports engaged by the Government for the expedition. At the first notice of the expedition being ordered, in the middle of August, I had applied to the Government of India to be allowed to accompany it as geologist, an application which was immediately granted; but, owing to the large staff of officers urgently required at the seat of war, and the comparatively small number of vessels which were started in October and November, I was not able to obtain a passage earlier. The vessel in which I sailed carried commissariat "followers,"—clerks, bakers, butchers, dhooly-bearers, &c., from all parts of India, Parsees from Bombay, Mahrattas from the Dekkan, Teloogoos from the Northern Circars, Tamuls from Madras, and Hindustanis from the North-west Provinces, under the command of Major Bardin, the chief of the excellent

off Cape Fartak, I shot a peregrine falcon. The next day another falcon, probably also a peregrine, alighted on the rigging, but I failed to secure it, and it flew away to seaward.

Our vessel lay at Aden for a day and a half, taking in a supply of water. I had one ramble amongst the barren volcanic hills, and, rather to my surprise, found two land shells, the widely-spread *Pupa insularis*, Ehr. (*P. pulla* or *Bulimus pullus*, Gray), which ranges from the Red Sea to India, and which is even found in the Irawady valley, near Ava; and a variety of *Bulimus labiosus*, Müll. The shells found were dead, and it is not easy to conceive upon what the living molluscs subsist, since the spot at which I found them, far up the sides of the mountain, is utterly destitute of vegetation.

All the rocks around Aden harbour are of volcanic origin, as are indeed, so far as is known, all the hills along both shores of the southern part of the Red Sea. These hills are frequently isolated by plains of sand; to the north of Aden such a plain extends for from thirty to forty miles, far beyond Lahej. That the Aden hills consist of the remnant of one or more volcanic cones is amply evident, and the hollow in which the cantonment is built is usually spoken of as "the crater;" but whether it be really in the position of the ancient vent is by no means certain, the rocks having been so greatly removed by denudation that it is very difficult to form any opinion as to the original form of the cone.

Aden is so well known to every Anglo-Indian that any remarks upon its geology or fauna may be commissariat officers detached by the Madras Government to the aid of the hardly-pressed Bombay Commissariat, and an old friend of my own, our acquaintance having begun many years before in the remote regions of Upper Pegu.

We had a very pleasant and most uneventful sail of ten days to Aden. The pace was in general too good for a towing-net to be used; but, after some difficulty, and the loss of several nets, I succeeded to some extent, and obtained three species of *Ianthina* (*I. fragilis*, var. *roseola*, Rv., *I. globosa*, and *I. bifida*), two of *Hyalæa* (*H. uncinata* and *H. longirostris*), *Styliola corniformis*, and some of the peculiar embryonic forms *Sinusigera* or *Cheletropis* and *Macgillivraya.* Two species of *Litiopa* and an *Atlanta* were also captured.

Numerous peculiar forms of crustacea were taken, besides endless *Velellæ* and *Porpitæ.* It was curious to note how the two latter and the floating *Ianthinæ* were distributed, as it were in patches, over the surface of the ocean, especially towards the entrance of the Gulf of Aden: frequently after passing for hours almost without seeing any, the vessel would traverse for some miles a tract abounding with floating life.

The Indian Ocean is singularly poor in birds. Tropic, or, as the sailors call them, boatswain birds (*Phaëton rubricauda*), were the only kind commonly seen. A nightjar came on board about half-way between Bombay and Aden, of a species which I could not identify; and when about forty or fifty miles from land, I landed the next day on Ajusé with some difficulty, the boat being nearly capsized in the breakers. The island is quite flat, not more than twenty or thirty feet above high-water mark, and composed of a calcareous rock formed by the consolidation of blocks of coral and shells. The edges are quite vertical and cliff-like, although of course only twenty or thirty feet high; a shoal, over which there are only two or three feet of water at low tide, runs out for a varying distance, from a few yards to a quarter of a mile, and terminates abruptly. Outside the reef the water is generally about ten to twelve fathoms in depth. Other islands in the neighbourhood have precisely the same formation. On the flat stony surface of the island stunted bushes are thinly scattered, and afford sustenance to some of the most miserable-looking goats it was ever my fate to set eyes upon, dwarfed in stature, wretchedly thin, and, apparently without exception, affected with chronic catarrh.

On the evening of December 21st, two steamers came in from Bombay and Aden, each with a ship in tow, and next morning one of the steamers took our vessel also, and all started for our destination, which we reached in the evening. The course lay round the Buri peninsula, through comparatively narrow channels between coral islands similar to Ajusé, until turning sharply to the south, we entered the great lake-like expanse of Ghubbet Daknoo, or Annesley Bay, as it was named by Lord Valentia, through the narrow eastern channel between the little gneiss island of Dissee and thought superfluous. Yet, like many places frequently visited, it is very rarely, if ever, carefully examined, and its fauna especially might be much more completely ascertained with advantage. Except Neophrons, kites, and a few crows (?*Corvus umbrinus*), the only other common birds about the hill in December were *Saxicola (Cercomela) melanura* and another *Saxicola*, doubtless *S. isabellina*. I also saw a crag martin (*Cotyle rupestris*).

We left Aden on the evening of the 16th December, and early the next morning ran with a fair wind through the "Gate of Weeping" into the Red Sea. In the evening of the 18th we were off Amphila, but light winds setting in, we only reached the flat coral islands of Ajusé, forty miles further, on the 20th. Here we found two or three other vessels waiting to be towed to the anchorage at Annesley Bay, while H.M.S. *Star* was lying in apparently most unpleasant proximity to the breakers, though really in deep water; the officers and crew being busily engaged in completing a temporary lighthouse. Another had already been finished nearer to the entrance into Annesley Bay. A singular circumstance had taken place a day or two before we arrived. A small boat from the ship had attempted to anchor close to the island, when the anchor was seized and the boat dragged violently along by an enormous fish; evidently, from the men's description, a huge ray. Whether the anchor had caught in the fish, or whether the latter had swallowed the anchor, could not be told. To save the boat the men on board were obliged to cut the rope attached.

mass, of which the greater portion has been removed by denudation.

An account of one or two short excursions made from the camp may serve to give a slight idea of the country around the bay, and its fauna. On the 28th December I joined a small shooting-party, consisting of Captain Daniels of the Transport Train, Captain Chrystie of the Engineers, and Lieutenant Protheroe of the Madras Sappers. We left at nightfall in a small Arab boat for the head of the bay, about eight or ten miles distant. It was a calm night when we started, but a strong wind sprang up, and we were obliged to anchor off the opposite shore, with an uncomfortably rough sea. Our boat's cables, however, were none of the best: two parted, one after the other; the waves meantime, to make matters pleasant, breaking on some rocks just astern of us; and after drifting nearly into the breakers, our Arab crew, with that amount of noise which only Orientals can make when they consider themselves in danger, succeeded in getting up sail and beating off. We tacked about until daylight. In the morning we had to wade, more than waist-deep, to the shore; however, we succeeded in landing our guns, and found ourselves on a very rocky coast quite at the bottom of the bay. There were no cliffs of any height, but black basaltic masses rose forty or fifty feet from the sea in most places, here and there receding into little sandy bays, with patches of mangrove bushes. In one of these we landed, and as soon as we could started inland in search of game.

the volcanic mass of the Buri peninsula. The bay is well known as one of the most lovely spots in the Red Sea. Hills rise around it on all sides, and, to the westward, range towers over range in the great scarp of the Abyssinian highlands. The coast is fringed by rich green bushes, giving a deceptive appearance of fertility.

It is unnecessary to dwell upon our landing, or to describe the camp of Malkatto or Zulla, with its dust and flies, its polyglot inhabitants, its vast energy, and its busy, excited population. All its peculiarities have been related by abler pens, and I would rather refer to the excellent letters of Dr. Austin in the *Times*, and of Mr. Shepherd in the *Times of India*, and to the descriptions in Mr. C. Markham's "History of the Abyssinian Expedition," and other published accounts, than attempt to repeat what would certainly not, at this time, have the merit of novelty. I remained in Zulla and its neighbourhood until the 10th of January, making a few excursions; and on this and subsequent occasions I had a fair opportunity of studying the rocks and fauna of the surrounding country. The camp itself stood upon an extensive sandy plain of alluvial origin, which extends for several miles along the coast, and inland as far as the base of the great ranges, interrupted, however, here and there, by small craggy hills. Two of these are about two miles south of the spot occupied by the camp, and consist of a succession of lava flows and scoriaceous ash beds, much disturbed and very irregular in dip, being evidently merely the remains of a large volcanic only one was killed. We also saw numerous traces of wild elephants, but they were said only to visit this part of the country after the spring rains.

Passing over a little rocky range of basaltic hills and traversing some stony ground, we entered another small plain, on which the bushes were less thick, and saw a numerous herd of a kind of large gazelle (*Gazella Sœmmeringii*), of which two bucks soon fell to our rifles. They were fine animals, equal in size to the common antelope of India, but with longer legs. Both males and females had rather short lyre-shaped horns.

It was now getting hot, and we had shot over some miles of ground, so we began to return towards our boat. On our way, however, which lay over undulating, rocky ground, we met with new kinds of game. Several Beni Israel (*Neotragus saltianus*), one of the very smallest antelopes known, a most elegant animal, of an ash-grey colour on the back, passing into rufous on the flanks and legs, and white beneath, and short straight horns in the male only, ran out from the bushes like hares, but at far greater speed. I saw a few red-wattled lapwings (*Sarciophorus tectus*), and a large flock of painted sand grouse (*Pterocles Lichtensteini*). While scrambling over the rocks close to the shore I suddenly startled a number of little animals about the size of small rabbits, which scuttled over a pile of stones and hid in the crevices. I rolled one over, and on picking him up recognised a small hyrax, one of the most singular mammals known, with the body of a rabbit, the head of a marmot, no tail, and the dentition of a rhino-

We had not left the shore before one of the men with us descried a pig, and stalking up I caught sight of a beast certainly more curious than beautiful. A pair of immense tusks issued from a huge misshapen head, with great knobs protruding at the side, and a disproportionately broad muzzle. The body was not unlike that of other wild pigs, except that the tail was longer, with a larger tuft of hair at the end. A bullet rolled him into the bottom of a ravine for the moment, but he ultimately escaped, his courage being evidently by no means equal to his highly ferocious appearance. It was an Ælian's wart-hog (*Phacochœrus Æliani*), a form of pig peculiar to the African continent, and bearing a most comical resemblance to a hippopotamus in its enormously broad head.

Shortly after a small herd of five or six smaller wart-hogs passed near us. They kept in single file, with their tails straight in the air. We then turned up a nearly level plain, covered with bushes and thorny acacia trees, and soon came upon an abundance of smaller game. A large partridge, with the skin of the throat naked, and of a bright red or orange colour (*Pternestes rubricollis*), rose in coveys. Two or three hares, with very large ears and long legs, but small bodies (*Lepus ægyptius*), were turned up and shot. The next game which appeared was a large flock of guinea-fowl with blue wattles (*Numida ptilorhyncha*), about two hundred in number, which however ran ahead of us, keeping out of shot, until we succeeded in surrounding them amongst some bushes. Several bustards (*Otis Arabs*) were seen, but *alba* and *Budytes melanocephala*), white-breasted crows (*Corvus scapulatus*), kites (*Milvus migrans*), the small red-headed vulture (*Neophron pileatus*), and the scavenger vulture (*N. percnopterus*). A little green bee-eater (*Merops viridissimus*), very closely resembling the bird so abundant in India, was common in the mangroves on the shore; and at the hot spring of Atzfut I obtained the handsome red *M. nubicus.* The shore abounded with gulls (*Larus fuscus, L. Hemprichii, L. leucophthalmus,* &c.), pelicans (*P. phillipensis*), terns of several species, ring plovers, curlews, egrets, stints, and sandpipers, and flocks of *Dromas ardeola* were not uncommon. It will not a little surprise an ornithologist to observe that several of the birds mentioned are comparatively rare species, much less known than those of the less accessible Abyssinian highlands.

Farther inland, amongst the thorny acacia trees, the fauna was more varied. A most lovely little *Nectarinia* (*N. habessinica,* H. and E.) was frequently seen, but at this season was the only species met with. The red-breasted bush shrike (*Laniarius cruentatus*), the long-tailed robin (*Cercotrichas erythropterus*), the black-tailed chat (*Cercomela melanura*), a weaver bird (*Hyphantornis galbula*), and two species of avadavats (*Pytelia citerior* and *Estrelda rhodopyga*), were some of the kinds most frequently seen.

Mammals were not numerous. Hyænas were constantly heard at night; they frequently came into the camp, and occasionally attacked the mules. I never saw one close to the coast in daylight, but I believe that the ceros, to which utterly dissimilar animal, strange to say, this little "dweller amongst the rocks" has been found to be closely allied. To what particular species the specimen (the only one shot by me in the immediate vicinity of Annesley Bay) belongs, it is rather difficult to say; but I shall enter into the subject in the part especially devoted to Zoology.

We re-entered our boat, and beat slowly back to the camp against a light sea-breeze. Soon after our visit it became generally known that game abounded at the head of the bay, and, in consequence, so many shooting-parties visited the spot that the animals became too wild to allow any one to approach within a reasonable distance.

For several days I remained at the Malkatto camp, and occupied myself in collecting specimens of birds, &c. The most common land birds were larks, chats, and shrikes. Of larks, no less than four species were common, *Galerita cristata, Calendrella brachydactyla, Certhilauda desertorum*, and, perhaps most abundant of all, a pretty little finch-like *Pyrrhulauda* (*P. melanauchen*, Cab.). Two *Saxicolæ* abounded, *S. deserti* and *S. isabellina.* Two shrikes also were common; and, singularly enough, both appear to belong to species hitherto almost overlooked: the one a variety or local race of the Indian *Lanius lahtora,* for which Dr. Finsch proposes the name of *L. fallax,* and the other, the rare *L. isabellinus* of Hemprich and Ehrenberg. A small *Drymœca* (*D. gracilis,* Rüpp.) hid itself amongst the bushes. The only other common land birds were wagtails (*Motacilla* not uncommon, but, as is the wont of the group to which it belongs, it was much more solitary in its habits than its congener. It is almost identical with the common "chinkara" or "ravine deer" of India (*Gazella Bennetti*).

The only common reptiles were a small lizard (a species of *Acanthodactylus*), and a very venomous little viperine snake (*Echis arenicola*), several of which were killed in the camp, and which were at one time so prevalent that it is surprising no accidents occurred from their bite. All seen by me were, however, too small to have rendered it probable that they could have caused death to a man. Their presence in the camp, though decidedly objectionable, was not much noticed amongst the rather numerous annoyances which life at Zulla entailed.

On the 1st January, 1868, I rode over to Hadoda, sixteen miles distant to the westward, at the entrance of the Haddas ravine, up which one of the best-known passes leads to Halai, Dixa, and Takonda or Degonta, on the Abyssinian highlands. Water occurs here, and the post, together with another, four miles further north, at Ooah or Wia, had been occupied by strong detachments of the 3d Bombay Cavalry, the majority of whom, however, in consequence of great mortality amongst their horses, had already been removed to the highlands, leaving only a small guard of dismounted sowars in charge of the commissariat stores, tents, &c. Major Bardin having been sent to arrange about the removal of surplus stores, I accompanied him.

spotted species (*H. crocuta*) was that most prevalent. *H. striata* is also said to occur. Jackals were common enough, but by some singular fatality I could never succeed in securing a specimen. When on horseback without a gun, I have often passed within a few yards; but when looking for specimens, I rarely saw more than a tail retreating at full speed amongst the bushes fifty yards away. All I can state of the kind is that it is quite different from the jackal of India, and also from that of the Abyssinian highlands, being a much more slightly-built animal, with longer legs and a much greyer colour. The cry, too, is very distinct. It is probably *Canis riparius* of Hemprich and Ehrenberg; but species of jackals, like cats, *Hyraces*, and many other animals, have been confused by naturalists, many of whom only know them in the form of dried skins, to an extent which renders identification difficult. I once obtained a fine wild cat (*F. maniculata*), which took refuge in the camp amongst a pile of pack-saddles, and was caught, singularly enough, on one of the hooks intended for holding the loads. Hares were common until they met their fate at the hands of the British soldier and his dog, and the only mammals except the hyænas and jackals which profited by the British occupation were some small bright rufous jerboa mice, with very long hind legs, which found unwonted supplies of food in the commissariat stores, and increased and multiplied until the ground around the huts and tents was riddled with their holes. Besides the large Sœmmering's gazelle previously mentioned, the Dorcas gazelle was wonder that the men were not sanguine. They had lost their horses by the epidemic which at that time raged amongst the animals, and they were left isolated, whilst their fellow-soldiers had proceeded to the front. No human being has fewer resources in himself than the native of India. Many of them were suffering from fever, mainly caused, I expect, by disgust. They were removed and sent to the front shortly after.

On rising the next morning I saw a singular spectacle. A large troop of baboons, at least 200 in number, were hunting for any corn dropped upon the ground in the place where the horses had been picketed. They were the first I had seen, though the sight of these uncouth monkeys soon became familiar enough. The species (*Cynocephalus hamadryas*) is the well-known dog-faced baboon of North-eastern Africa and Arabia, the same which is frequently represented on Egyptian monuments. The male is a most formidable-looking animal, something between a lion and a French poodle in appearance, with long hair over his shoulders and foreparts. The day before they had come into the commissariat enclosure, and commenced pilfering the grain.

The road from Hadoda to Wia was uninteresting. It traversed an undulating plain of metamorphic rocks, with thin jungle of thorny acacia trees. On the next day I returned to Zulla, but before doing so I climbed a high hill close to Hadoda, in order to make out, so far as possible, the general strike of the rocks, which, as is commonly the case in metamorphic countries, especially where the dip is low, appeared irregular. On my way

The road was pretty well marked across the plain, through a narrow gorge between basalt rocks, where the Haddas has cut its way through the little spur of volcanic beds stretching south from the Gadam range, and thence along the dry sandy watercourse, to the base of the hills. Along the banks of this watercourse are some fine tamarisk trees, affording shelter to numerous bulbuls (*Pycnonotus arsinoë*), hornbills (*Tockus erythrorhynchus*), barbets (*Trachyphonus margaritatus*), and other birds, whilst under their shade the red-throated francolins (*Pternestes rubricollis*), Beni Israel antelopes, and hares abounded, and on the surrounding plain we saw a few of both kinds of gazelle. I shot a doe Sœmmering's gazelle, and could have killed another, but, having no means of carrying the animal in, I let it go. At the base of the main mass of hills the road entered upon metamorphic rocks, and traversed a small gorge cut through them, in which, for the first time since landing on the African coast, our eyes were gladdened with the sight of running water, and immediately after we reached the camp at Hadoda.

It was far from a lively sight. A few very dusty tents were surrounded by a thorn fence, and some very miserable-looking Indian native troopers lounged about, backed by a huge herd of camels, the most helpless, stupid, and melancholy-looking of all the beasts of the universe. A dismounted dragoon is proverbial, and certainly a dismounted sowar, if those who garrisoned the posts at Hadoda and Wia be taken as fair specimens, is not an improvement on the European prototype. No wonder that the men were not sanguine. They had lost their horses by the epidemic which at that time raged amongst the animals, and they were left isolated, whilst their fellow-soldiers had proceeded to the front. No human being has fewer resources in himself than the native of India. Many of them were suffering from fever, mainly caused, I expect, by disgust. They were removed and sent to the front shortly after.

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The remainder of my stay in Zulla or Malkatto camp was principally occupied in collecting animals and exploring the geology. Although there was no risk whatever in riding about the country, there was a great drawback in the difficulty of procuring water, and the necessity for horses to be in camp morning and evening, as otherwise they ran the risk of going without. The commissariat arrangements also, which necessitated the drawing up of a long document, as elaborate and formal as a mercantile invoice, before any rations could be obtained, involved a considerable loss of time at first.

Before proceeding to describe any part of my subsequent journey, a brief sketch of some of the geological features observed in the neighbourhood of the landing-place may be given.

The eastern shore of Annesley Bay appears to consist mainly, if not entirely, of volcanic rocks. The island of Dissi, however, at the entrance of the bay, is entirely composed of metamorphics, the strike of which is nearly north and south.

The high range of Gadam, the peaks of which are about 3,000 feet above the sea, rises sharply from the west shore of the bay near its entrance, and is entirely composed of metamorphic rocks, with the same general strike as Dissi. The hill is comparatively isolated, the usual road from Zulla to Arkiko passing behind it. At the base of the main range of the Abyssinian highlands a few miles farther west, the rocks near Hadoda, at the entrance to the Haddas pass, consist of mica-schist and hornblend schist. At Wia granitoid gneiss occurs. These rocks have a low dip to west-south-west, variable in amount, but not exceeding 30° or 40°.

Between Hadoda and the southern portion of the Gadam range there is an alluvial plain covered with sand and gravel, evidently deposited by the torrents from the hills. Between this and the coast plain around Zulla a low spur extends for some miles from the south end of the Gadam range, composed of volcanic rocks, similar to those forming the low hills already mentioned near Zulla. Through these the Haddas torrent cuts a small gorge, with precipitous basaltic cliffs of no great height on each side. The road from Malkatto to Hadoda passed, as already mentioned, through this gorge; the beds intersected appear to be horizontal; farther south, at the extreme end of the spur, they dip east at about 20°, but the dip is not constant, and there has been much disturbance. One stratum, a little north of the road from Zulla to Komayli, consists of soft lapillæ; it is stratified, and presents the appearance of having been deposited from water, as it contains flakes of mica and fragments, rounded apparently, of volcanic ash. None of these hills present the appearance of having been parts of a distinct cone.

The plain formed by the alluvial deposits of the Haddas, the Komayli stream, and another torrent further south, extends along the coast for about eight miles south of Zulla, as far as the hot spring of Atfé or Atzfut, which rises at the edge of a dense cluster of mangrove trees, close to the seashore. The water is brackish, but not sufficiently so to prevent its being drunk by animals. The rocks which here approach the shore are volcanic, and similar beds skirt the hills for some distance to the west. Farther inland, gneissic rocks crop out, and the range along the edge of the bay to the southward, as far as the Turkish outpost at Arafilé, is composed of metamorphics. On one hill, south of Atzfut, trap rests upon the gneiss at some height above the base of the hill. At Arafilé trap comes in again, a small alluvial plain intervening near the sea, on which, at the time of my visit, there was an immense herd, 400 or 500 in number, of the fine antelope *Gazella Sœmmer-*

ingii, which at first abounded around Zulla also, but was gradually extirpated or driven away. Just south of the Turkish military camp at Arafilé is a very perfect volcanic cone, evidently of much later date than the two other volcanic hills. It is about 300 feet high, and composed mainly of fine volcanic ash.

On the 7th of January, at the desire of Colonel Wilkins, I rode to Komayli, the first march on the road laid out to the highlands, to examine the water-supply. The road was similar to that to Hadoda, but much more dusty, in consequence of the traffic. Long strings of mules and camels, laden with stores of all kinds, were constantly to be seen going and returning. The railway was as yet in embryo, the first steam-engine being landed about this time. Komayli lies at the entrance of a better-defined gorge than that which debouches at Hadoda; and when the pioneer force first examined the locality, there was running water here also. This had disappeared; but wells of no great depth had been dug in the torrent bed, and the little American Norton's pumps, afterwards so largely used, had been employed for the first time. A brief examination of the wells convinced me that there was very little fear of the water failing; and I was enabled to report most favourably on the prospects of what was, at the moment, one of the most important necessaries for the progress of the army. My report only confirmed that of the engineer officers, who had already examined the spot, and was fully borne out by the results. The wells at Komayli not only supplied amply the immense camp of both men and animals which was concentrated there, but had the campaign lasted longer, it was intended to have taken the water in pipes to Zulla.

The temperature of the water was remarkably high, so much so that I suspected part of the supply was derived from a hot spring. But all wells in this neighbourhood are singularly warm. In one which was subsequently dug by the Punjab Pioneers, about six miles from Zulla, the water was far hotter than at Komayli, and certainly much above the average temperature of the air. Coupling these facts with the presence of a hot spring on the shore at Atzfut already mentioned, and with that at Ailat to be subsequently noticed, it appears probable that nearly all the subterranean waters in the neighbourhood of Zulla and Massowa have an unusually high temperature; a fact perhaps connected with such evidence of geologically recent volcanic action as is afforded by the cone at Arafilé.

I rode back to Zulla the same evening. The Commander-in-chief, Sir Robert (now Lord) Napier, had landed in the morning, and, on hearing my report, directed me to proceed to Mayen or Undul Wells, two marches beyond Komayli, and ascertain all I could concerning the water-supply there. The pass which had been selected for the road to the Abyssinian highlands consisted of a ravine running nearly north and south, or parallel to the general direction of the great scarp bordering the high country, from Komayli to Senafé, a distance along the bed of the torrent of about fifty miles. In two places, at Suru, twelve miles beyond Komayli, and at Rahaguddy, or, as it was more commonly called, Rereguddy, ten miles below Senafé, running water was found; but between these two a march of twenty-nine miles intervened. In order to break this, a well had been dug by the engineers at a place called by the natives Mayen, but subsequently known in the army as Undul Wells (the Undul being a torrent which enters the main ravine a little above). My particular duty was to ascertain, as far as possible, the prospects of the water-supply at Mayen, and to inquire if it could be supplemented in case of failure.

After some difficulty in obtaining mules, I started on the 10th, and rode across to Komayli. The next morning I started up the pass, with Captain C. B. Smith, of the Commissariat, and Lieut. St. John of the Engineers, who had charge of the telegraph in course of construction. The latter is an excellent ornithologist, and both on this occasion and often subsequently gave me information and specimens.

Komayli, as already mentioned, lies at the spot where the long ravine ends, on the verge of the coast plain. The road, on leaving the camp, enters a valley, about half a mile broad at first, but much narrower afterwards, its bottom composed of a deposit of boulders, pebbles, and sand brought down by the torrent, upon which a tolerably dense vegetation has sprung up. The hills rise abruptly from the side; they are entirely composed of metamorphic rocks. Close to Komayli, gneiss and micaceous schist, with garnets, are seen, the lamination dipping east on the south side of the ravine, and north-east on the north, at a low angle. About three miles up the ravine its course, which has so far been nearly due west, turns suddenly to the south, and assumes the direction which, with many local changes, continues to Senafé; and here the foliation of the gneiss rolls over, and dips first north-north-west and then west.

The road at this time was only very imperfectly made. The process of road-making, by the various regiments employed, consisted in marking out a trace twenty feet broad, felling any trees which might be in the way, cutting down steep banks, and removing the boulders. The road thus formed was, of course, rather heavy, being often over gravel, but still a great improvement on the mere torrent bed. But in January a commencement only had been made, the whole efforts of the Sappers being devoted at first to rendering practicable such difficult parts as the Suru defile. It was not always very easy to tell the road, as lateral valleys of considerable size sometimes entered the main one. The path, however, was pretty well marked in general, and could usually be recognised by the carcases and skeletons of mules and camels scattered along it. We passed several of the Shoho inhabitants of the country—uncouth-looking beings, mostly with bushy masses of hair transfixed by wooden or horn skewers, little or no beard, and a small quantity of very dirty cotton clothing. The women had invariably a leathern petticoat, frequently ornamented with cowrie shells. They were, if anything, more ill-favoured than their lords and masters. At a subsequent period of the expedition, these people became so far civilized as to dress themselves in an outer garment made of old gunny bags, the coarse Indian fabric in which grain is packed. In January, such proofs of advanced civilization had not extended beyond Zulla.

These people are genuine Arabs, their hands against every man's, arrant thieves and cut-throats, but still with some principle of honour. Owing to the influence Mr. Munzinger had with them, he succeeded in inducing them—for payment, of course—not only to cease from plundering to a great extent, but to become carriers to the army ; and enormous quantities of commissariat stores were conveyed by them. Some petty pilfering, of course, took place, but, I am convinced, far less than was generally supposed.

There is no cultivation in or about the pass, so far as I saw. The people live mainly on the milk of their herds, and on "durra" or millet (*jawari*) brought from the highlands. The cattle are small, but well formed and in good condition, all being humped, and having horns of moderate size spreading from the side of the head, not rising in a curve as in Indian humped cattle. The goats are rather fine, the males being magnificent patriarchal fellows, with grand twisted horns two feet and upwards in length.

The fauna in the lower portion of the pass was not remarkable. Vultures, of course, abounded, and I once or twice saw a lämmergeyer (*Gypaëtos meridionalis*), conspicuous by his pointed wings and tail and great size. The most interesting novelty to me was a kind of ground squirrel (*Xerus rutilus*, Rüpp.), of which we saw several together running over the rocks. It has rather long, coarse, harsh, almost bristly hair, and a fine bushy tail.

About six or seven miles from Komayli we met a native of India with a camel and a mule, who complained of having been robbed by two Shohos. The thieves had run into a small ravine close by, and we immediately afterwards saw them climbing up the rocks. I slipped a couple of bullet-cartridges into my breech-loader, but my companions begged me not to shoot the thieves, and I felt no particular inclination to draw the first blood in the campaign, so I contented myself with frightening the Shohos by sending five or six bullets as near to their heads as I could without risk of hitting them. I was rather glad I had let them off when I found that the whole plunder consisted of a small bag of rice, which, of course, they had to abandon in their flight.

About ten miles from Komayli the ravine suddenly contracted, owing to the greater hardness of the rocks, and we entered the magnificent gorge known as the Suru pass. Here the formation consists of a very hard, massive rock, chiefly composed of felspar and quartz; almost all trace of foliation is lost in general, but where it can be made out, it is generally nearly vertical. The water, which in other parts of the ravine runs beneath the gravel, is brought to the surface, and forms a little stream containing small fish. The bed of the torrent consists of immense blocks of rock, some of which were being removed by blasting, whilst over others a ramp was made to carry the road. A large number of Bombay Sappers and Beloochees were occupied in this work, and the narrow gorge resounded with the hum of voices and the ring of hammers and crowbars, as it had certainly never done before since the torrent first cut it out of the solid rock.

On each side of the ravine rose steep beetling cliffs to a great height. They are in most places quite inaccessible, and on one occasion, in May, towards the close of the expedition, a flood came down from the highlands, and some mules and men were swept away.

We reached the top of this gorge, and found the camp at Suru, with the Beloochees under Major Bevill. It was in a narrow cramped space, and uncomfortably hot in the middle of the day. The lovely little *Nectarinia habessinica* abounded in some small trees, and numerous *Hyraces* inhabited the rocks around. I here also again came upon *Pectinator Spekei*, the peculiar rodent first seen at Hadoda.

The next morning Dr. Boustead, of the Beloochees, who had been out to look after elephants, returned, having killed two in a valley about ten miles away to the eastward. I was busy skinning two or three squirrels and other animals which I had shot the day before, and did not start till mid-day. Owing to the reports of Shoho thieving, I did not like to leave my mules alone, and accompanied them. Soon their wretched condition began to tell. One fell, and I transferred the greater part of the load to my horse; then another dropped; and finally, after endless delay, I only reached the camp at Mayen or Undul Wells after nightfall.

A great change took place in the fauna on this part of the road. Suru is 2,000 feet above the sea, Undul Wells about 3,400, and the sub-tropical fauna is entered, containing some of the animals peculiar to the Abyssinian highlands. Instead of the white-breasted crow of Zulla, a black, short-tailed bird (*Corvus affinis*) occurred. It is very raven-like ; indeed, it is classed as a raven by some naturalists. A king crow (*Dicrurus divaricatus*), a very noisy yellow-billed hornbill (*Tockus flavirostris*), a crateropus (*C. leucopygius*), a large partridge (*Francolinus Erkelii*), and a very handsome bee-eater (*Merops Lafresnayi*) were conspicuous.

The next morning was devoted to the wells. Two had been dug in the gravel of the torrent bed, and Lieut. Le Mesurier, an old acquaintance, who was in charge, was busily engaged enlarging and deepening them, and adapting one for a kind of chain-pump. The rocks at Mayen, though not quite so hard as at Suru, are very massive and quartzose, striking north-north-west and dipping at a high angle to the westward. They consist of various kinds of gneiss and hornblend schist, with quartz veins and a few greenstone dykes.

Our examination of the well was interrupted by the return of a corporal of Sappers, who had started for Senafé, but after going about two miles, had been knocked off his mule by some Shohos, and both his mule and his rifle had been carried off. A chase was soon organized, but was fruitless; neither mule nor rifle was ever seen again.

About a mile and a half up the ravine above Mayen, at a spot where several smaller valleys enter it, is a little plain, about a quarter of a mile across, and rather more than half a mile long, tenanted by many guinea-fowl when the pioneers of the army passed by, and hence always known as Guinea-fowl Plain. It is a flat, formed of boulders and granite deposited from the streams, and covered partly with thick thorny bush-jungle, partly with a very prickly aloe-like plant. It was much haunted by wart-hogs, hyænas, and Beni Israel, until, like the guinea-fowls, all, except the hyænas, found their way into the camp cooking-pots, and served to eke out the tough beef of commissariat rations. Small as it is, this plain is the broadest piece of level ground met with in the pass, and from it a view is obtained up some of the side valleys; one of these, the Undul torrent already mentioned, exposes at its head some noble cliffs of sandstone, part of the scarp of a plateau near Takonda between the Haddas and Komayli valleys. This small plain is also noteworthy as being the first place on the road to the highlands, where that fine and remarkable euphorbiaceous plant, the *kolqual,* was met with. To Anglo-Indians this plant was perhaps less striking than to Europeans, as a closely allied species abounds in parts of the Bombay Presidency; but the Indian plant is inferior in size and beauty.

It struck me that the base of these sandstone cliffs might be a very likely spot for a copious supply of water, and that it was at least worth the trouble to examine them. Inquiry from the Shohos was not satisfactory, especially when conducted, as in the present instance, through the medium of an Arab interpreter, who spoke very little Hindustani, and an old Shoho woman, who understood still less Arabic. However, having procured a guide, Le Mesurier and I started to explore the Undul valley, taking with us a small tent and a day's provisions on mules.

We had a most delightful and profitable ride, although the quantity of water found was small. For about six or eight miles we found a well-marked cattle-track leading up the torrent bed, at the sides of which were small flats, covered with fine acacia trees. Gradually the valley contracted, and the hills at the sides became higher, and in many places covered with huge tufts of coarse grass. At first these were all at a considerable elevation above our path, but we soon ascended to their level. The quantity was large, and the discovery—for it was a discovery—most important, since all forage had hitherto been brought from the seaboard, employing many mules, and, in fact, taking up a very large proportion of the carriage required for transporting provisions and stores to the highlands.[1] The grass was coarse, but the mules, and even the horses, ate it; and soon afterwards arrangements were made by Sir Robert

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[1] Although the mules were, at this time, very poorly fed, it was calculated that in going from the camp at Zulla to Senafé and back they consumed more than half their load. I pointed out the grass in the Undul valley to Lieut. Sturt, of the Transport Train, who brought it to the notice of the Commander-in-chief, and was placed in charge of the arrangements for collecting it by means of Shohos.

Napier, by which all the camps in the pass were supplied from the locality discovered by us, and others in the neighbourhood, thus effecting an enormous gain in the carrying power of the transport animals.

A large number of birds which I had not previously seen made their appearance a little above 5,000 feet. Amongst these the most conspicuous was the Abyssinian plantain-eater (*Turacus leucotis*), which flew from tree to tree, high above our heads for the most part, displaying its gorgeous crimson quill-feathers in its flight. I was somewhat surprised at seeing a green pigeon (*Treron abyssinica*) in small flocks. The handsome francolin (*F. Erkelii*) was very abundant; at almost every turn of the valley one or more were seen, which on our approach ran into the bushes, or up the sides of the hills, rarely taking to flight. This francolin is a noble game bird, the male being at least equal to a pheasant in size. A few Beni Israel showed themselves, and several *Hyraces* scampered away amongst the rocks; but four-footed animals were not numerous. A considerable change took place in the vegetation, two or three kinds of *Ficus* appearing, two of which were scarcely distinguishable from the peepul and banyan of India. The temperature also, towards evening, was decidedly cool.

Our Shoho guide had for some time persisted that there was no possible road, and that we should find no water; but, as there was an excellent cattle-track, we preferred seeing for ourselves, and at last he admitted that there was a very little water in one place. About evening we emerged from the narrow valley we had been traversing, at the very base of the sandstone cliffs which had attracted our attention in the distance, and found a small spring of excellent water. Of course this was of no practical value to the army ascending the pass: it was amply sufficient for our wants, however, and that of our animals, as well as supplying a Shoho village close by, the people from which brought us milk, and were very civil for Shohos. They called their village Undul—a name which has been applied to the camping-ground in the main pass, ten miles away.

The next day we attempted to climb the sandstone plateau. It was a most fatiguing ascent, through bushes and creepers, most of them thorny, and over very bad ground. We reached the sandstone, however; but, finding that another long descent and ascent intervened, did not go on to the plateau. I afterwards found that this spot was near Azawat, nearly north of Takonda. The view was very extensive. Over the ranges which hem in the Senafé pass a portion of Annesley Bay and its eastern shore could be seen. The extreme horizon was misty; but, looking to the southward, it was just possible to distinguish a vast sandy expanse, with a peculiar whitish colour, the northern portion of the great salt plain near Amphila.

The metamorphic rocks extend for a long distance up the hill, and are capped by about 500 feet of coarse white sandstone. They are much contorted, but preserve a general north and south strike. Close to the spring in the valley are some highly bituminous schists.

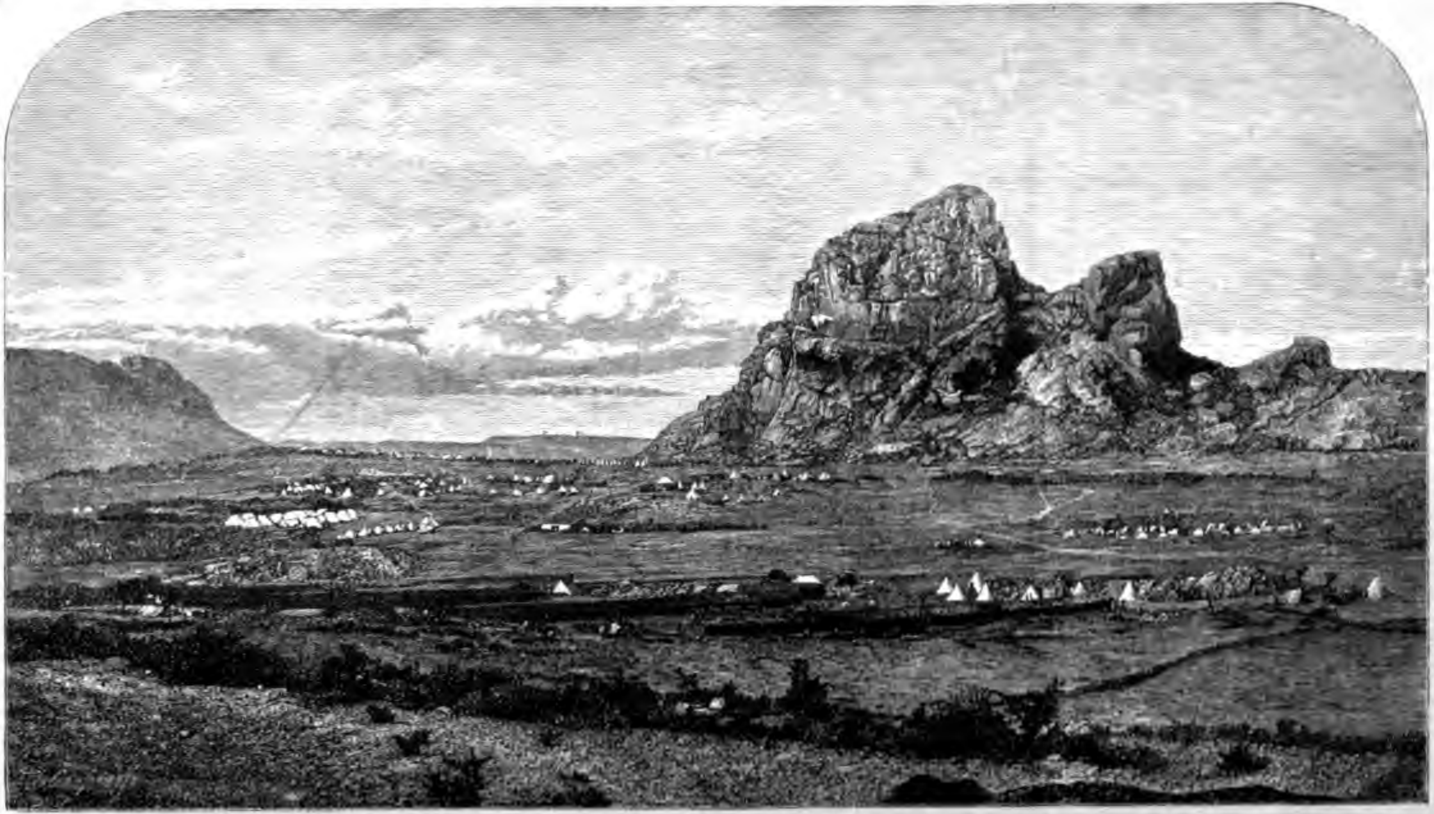
In this ramble I obtained a few land-shells, the first I had met with. There were not many kinds. *Helix Darnaudi*, *Vitrina Rüppelliana*, a single specimen of *Bulimus Olivieri*, and two small *Pupæ*, were all I could find. They appeared more abundant on the upper parts of the hill-side.

We returned to our camping-ground, and found it was too late to go back to Undul Wells that day, so deferred doing so till next morning. On reaching it, I found one of my horses ill with the disease which had proved so fatal to the cavalry and baggage animals. For two or three days he was most dangerously ill, but at length recovered, and I subsequently used him throughout the campaign. Rum-and-water and quinine were the remedies used. At first the horse objected to them; but after a day or two he took a strong liking to grog, and swallowed his dose with the greatest satisfaction.

I spent three or four days in searching the side valleys around Mayen, and ascertaining the presence or absence of springs. Small quantities of water occur in several instances, usually at a place where a band of very hard compact rock crosses the valley, and causes a very small stream, which elsewhere runs beneath the gravel at the bottom of the ravine, to appear at the surface. There is almost invariably a sudden drop in the valley at this spot, so that after rain there must be a waterfall, and in the dry season the water trickles slowly over the rocks. All the springs appear to contain carbonate of lime, which is deposited in immense masses of calcareous tufa.

One spot struck me as very remarkable. I followed a ravine which enters the main pass at Guinea-fowl Plain for about three miles. Some Shohos tried to turn me back, but, although I was alone, I was well armed, and found it convenient to misunderstand them. At length I reached a spot where the valley appeared absolutely to terminate. On one side was a precipice of granitoid gneiss about a hundred feet high, on the other a still higher wall of tufa overhanging at the top. Down the granitic rock trickled the smallest of streams, sufficient, however, to attract numerous hamadryas monkeys, who sat on the rocks around. The tufa cliffs were the roosting-place of a large colony of *Amydrus Blythi*, a rare bird, something like a starling with a long tail, black, with chestnut wings. In the evening these birds were flying around in considerable numbers, keeping up a constant chattering cry. I subsequently revisited the spot, and shot several specimens, to the consternation of the monkeys, who howled at me from the rocks above.

In Lieutenant Sturt, who arrived some days before at Undul Wells in charge of the transport train at that camp, I found a capital ornithologist, and we had many rambles together in search of birds. At a subsequent period the same officer took charge of one of my native collectors. The fauna of Undul Wells and its neighbourhood is very interesting, comprising several birds which are found neither on the highlands nor on the sea-coast, such as two woodpeckers (*Picus Hemprichii* and *P. nubicus*), a little barbet (*Barbatula pusilla*), and a



VIEW OF THE BRITISH CAMP AT SENAFÉ, FROM THE NORTH.

(From a Photograph by Dr. Cook.)

wren (*Oligocercus micrurus*), almost all of which I subsequently found in the Anseba valley.

On the 21st of January I rode up the pass to Senafé. Except that the ravine gradually contracts, there is no great change in its appearance for some miles above Undul Wells. The hill-sides become greener, and similar changes take place in the fauna and flora to those already noticed in the Undul ravine, plantain-eaters, green pigeons, and other birds making their appearance. About Rahaguddy, at an elevation of 6,000 feet, the alteration is much greater. The metamorphic rocks have become much more slaty, a character which they maintain till beyond Senafé. The road close to the camping-ground at Rahaguddy traverses a very narrow gorge with a small stream of water trickling through it, which stream, however, is not, like that at Suru, constant throughout the year.

Ascending beyond Rahaguddy, the path traverses more open ground, the immediate sides of the ravine being lower and less steep, so that the hills beyond are visible. To the south tower the sandstone precipices of Mount Sowera; on all other sides are fine hills, of varying form, composed of metamorphic rocks, sandstone or trap, covered with forest, still thin, but much finer than that in the lower portion of the pass. Leaving at length the torrent bed, the road ascends through what was, in January, a wood of high juniper trees. Here I found a large party of the Punjab Pioneers engaged in making the cart road, which was finished soon after. It was afternoon, and the air was delightfully cool, even cold, producing the exhilarating effect peculiar to a mountain atmosphere, and which is nowhere felt so thoroughly as within the tropics.

At the commencement of the ascent from the ravine, trachytic rock, approaching claystone in mineral character, appears, and continues nearly to the top of the scarp, where basalt replaces it. The trachyte is so much decomposed that it resembles argillaceous sandstone, and it was not till afterwards that I distinguished its real character. The opposite side of the ravine consists of metamorphic rocks, with, in one spot, an isolated block of sandstone.

I soon reached the top of the scarp, and found myself fairly on the highlands of Abyssinia. A broad flat open valley with some fine isolated hills on each side led to Senafé, and I cantered pleasantly along a good even road. The ground around had been recently in cultivation. No villages were to be seen at first, but soon under the precipitous sides of the hills a number of flat terrace-like projections became visible, and these on a nearer approach proved to be flat-topped huts, the walls built of stones, and so closely resembling the hill-sides in colour that they might easily be taken for a portion of them. About two miles from the top of the pass the valley expanded into a plain dotted over with the white tents of the British camp. To the right hand, west of the camp, were a number of barren craggy hills of most singular form, apparently of sandstone, but really of claystone and trachyte. These hills will be described in a subsequent page.

I only remained a night in Senafé. It was bitterly cold, and in the morning the ground was white with hoar-frost. The next day I redescended the pass, examining on my way several places, where small quantities of water were found. The supply was in no case sufficient to prove of much service in supplementing the resources of Undul Wells.

At Mayen I found much improvement. The well had been deepened, and an improved kind of chain pump (Brasyer's) substituted for the little American pumps (Norton's) which had hitherto been used. A careful test of the supply by Lieut. Protheroe and myself showed that the well could yield about 700 gallons an hour.

After a day or two spent at Undul Wells, I returned once more to the sea-coast. I had not been able to take any of my appliances for collecting skins, &c. with me, and had consequently left my native taxidermist with my tents at Zulla. On my way down I met Sir Robert Napier, who was on his road to the highlands, and I reported on the prospects of water-supply in the passes.

I found the camp at Zulla enormously increased in size. There were now about 10,000 troops encamped, and at least as many camp-followers of all kinds. A splendid fleet of upwards of 100 large ships and steamers lay at anchor in the roadstead. A large bazaar had been established, and shops filled with supplies of all kinds abounded. I found also that Dr. Cook, the meteorologist, had arrived from Bombay, bringing with him a second native taxidermist sent to me by Dr. Anderson, of the Indian Museum. The two men had collected a considerable number of birds, many of them of great interest.

With Dr. Cook I made another excursion of three days to the head of the bay, and obtained several mollusca and a few birds. The game had become very wild. For several days I occupied myself geologizing and collecting around Zulla. A change took place in the weather: a little rain fell, and the hills were covered with dense masses of clouds. We heard that heavy rain was falling almost daily about the lower portion of the pass. Meantime troops and stores were being rapidly pushed on to the front, and the camp was once more diminishing in size.

It was not till the 12th February that I could obtain carriage with which to start again for the highlands, and even then it was with great difficulty that I could manage to take with me sufficient stores for collecting. I remained two days at Komayli, where a considerable change had taken place, grass having sprung up and the trees put forth fresh leaves. The only conspicuous change in the fauna, however, was the presence in large numbers of the black Abyssinian crow (*Corvus affinis*), which, a month before, I had not met with below Undul Wells. Subsequently, several kinds of birds immigrated, many of which were still to be found in May.

Rain fell so heavily on the road from Komayli to Suru that my camels could not get on, and remained out all night. This necessitated another day's halt. At Undul

I again stopped for a couple of days collecting, and I finally reached Senafé once more on the 21st February. The rains did not extend into the hills quite so far as Undul Wells, and above the weather was fine, but less cool than in January.

By this time the advanced guard had reached Antalo. The Commander-in-chief was about two marches beyond Adigrat. I took up my abode in the commissariat lines near Major Thacker's tent, one of the best parts of the camp, and whilst awaiting permission to go on to the front I set to work to examine the geology of Senafé and the neighbourhood, which was very interesting, and to collect as usual.

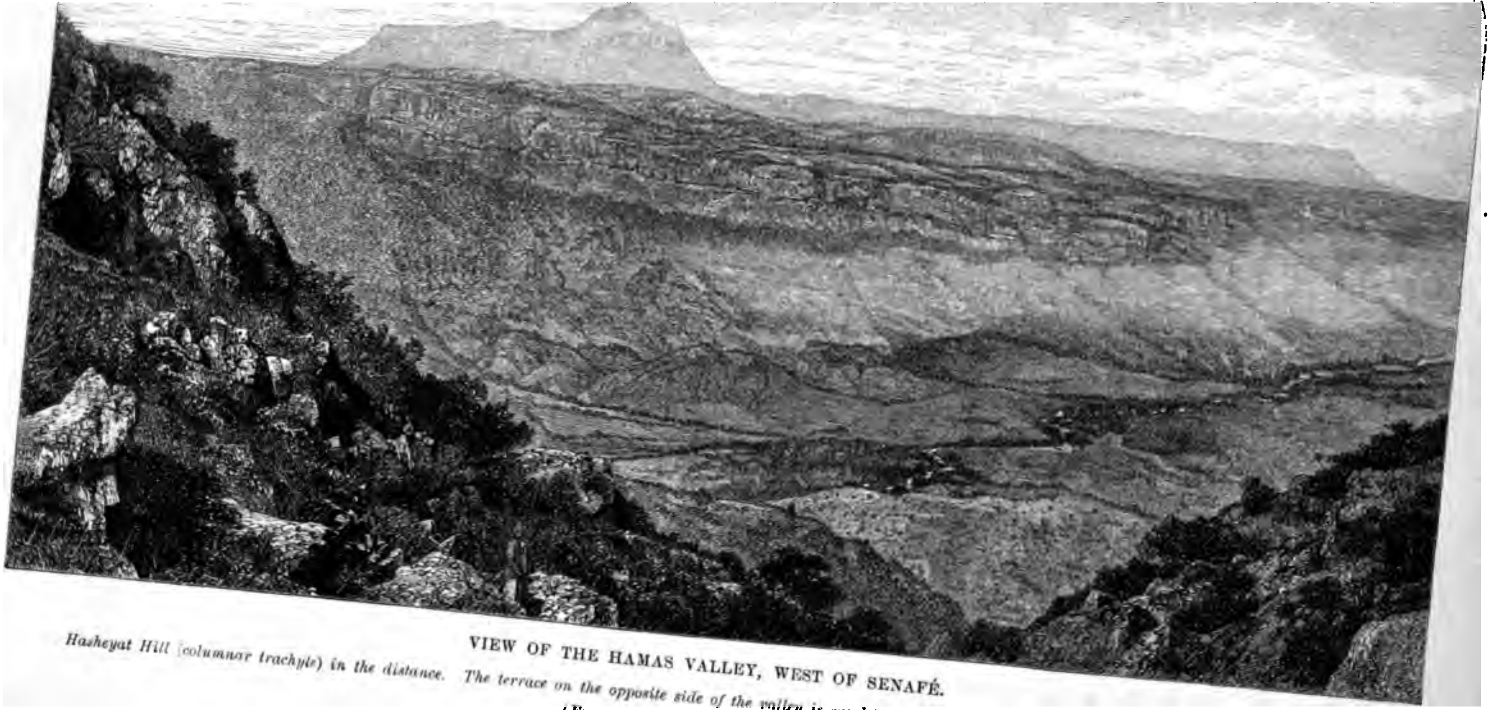
I have already briefly mentioned the position of Senafé in a plain with hills at both sides. Beyond the craggy rocks, just west of the camp, lies the head of a deep valley. To the north-east is the great mass of Sowera, entirely formed of sandstone; but south of it, separated by a small valley, is a trachyte hill. The majority of the other rises are volcanic in origin, consisting of basalt or trachyte, the latter greatly predominating. The greatest extent of these rocks is north-west of Senafé, in which direction they stretch more than half-way to Takonda. The culminating point, Akúb Teriki (or Arabi Teliki), is a most conspicuous object from all the country around. It lies nearly due north of Senafé, and west of the road at the head of the Komayli pass. From the spot where trap first appears, at the base of the last ascent in the pass, to the top of this hill, is a height of 2,000 feet, and the whole consists of trachyte or basalt. It is by no means clear whether this mass is intrusive, or whether it fills a hollow in the metamorphics.

The hill (Akúb Teriki) is flat at the top, the uppermost portion consisting apparently of a trachyte lava flow, rather coarse and gritty, resembling sandstone. It is of a greyish colour on a freshly fractured surface, but weathers brown. It contains grains of magnetic iron, which affect the compass. The lower portion of the hill consists partly of basalt and partly of trachyte.

A band of hills to the north-west is composed of hard, greenish-black basalt, compact and fine-grained, containing a little quartz and agate in irregular nodules. Beyond these again to the west, and also to the south, there is a considerable hilly tract of trachyte. There is nothing like bedding nor any regular superposition of one rock upon the other, such as is seen near Adigrat and south of Antalo ; the basalt is seen in one place about five miles north-west of Senafé abutting against the trachyte as if faulted, in another spot it appears to emerge from beneath it. Some volcanic ash is seen, which adds to the probability of a volcanic vent having existed in the immediate neighbourhood, but the rocks are far too confused for their history to be made out satisfactorily.

The trachyte forms cliffs of great height on the side of the deep valley west of Senafé and south-west of Akúb Teriki, the bottom of which consists of metamorphic rocks. (See Plate II.) The same rock forms a low ridge bounding the little cultivated plain at Senafé on the west. It is very compact and hard, greatly resembling a hardened sandstone.

PLATE II.



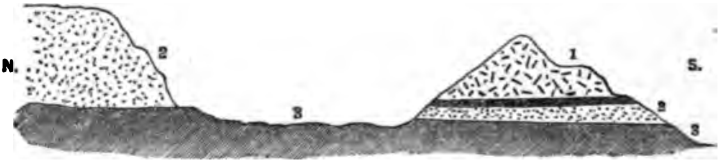
VIEW OF THE HAMAS VALLEY, WEST OF SENAFÉ.

Hasheyat Hill (columnar trachyte) in the distance. The terrace on the opposite side of the valley is sandstone, while the bottom of the valley lies on metamorphic rocks

(*From a Photograph by* Dr. Cook.)

This ridge joins the Senafé rocks, the remarkable crags already referred to (see Plate I.), which are immediately west of the position occupied by the British camp during the campaign. The rock composing these hills is softer and more earthy than that of the other rises, and the resemblance to an argillaceous sandstone is most remarkable. The form of these hills, and of those near Adowa, which are visible in the distance, and may probably be of the same rock, is so similar to the immense hummocks which generally occur in granite and granitoid gneiss, that they might easily be mistaken at a distance for the latter formation, as they were at the first sight by Colonel Phayre and the pioneers of the army. On a nearer approach, their resemblance to sandstone is greatly increased by their brown colour. Another point in which they simulate sedimentary rocks is in being traversed by dark ferruginous streaks and bands.

The hill immediately east of Senafé is of a rather different trachyte, greyer and more crystalline. It rests upon a thin bed of sandstone, and the latter upon metamorphics, so that the volcanic rock is in this case evidently a flow. As will be seen presently, the same is the case further south. This hill affords an excellent example of the complete unconformity between the trachyte, even when distinctly occurring as a flow, and the sandstone; for although the latter rock upon the sides of this hill nowhere exceeds fifty feet in thickness, the next hill to the north, one of the spurs of Sowera, only separated by a valley not half a mile broad, is entirely composed of sandstone, and is higher than the trachyte hills, being 300 or 400 feet at least above the plain, somewhat as represented in the accompanying sketch section.



1, Trachyte; 2, Sandstone; 3, Metamorphics.

Another hill similarly composed, trachyte resting on a thin bed of sandstone, with metamorphics below, lies about three miles south of Senafé, just west of the road to Guna Guna. To the west of this, and south of the deep ravine already mentioned as commencing just west of Senafé, is another extensive plateau, mainly composed of sandstone, from which, about eight miles west by south from Senafé, there rises a fine trachyte hill, called Kishyat. The northern face of this hill is precipitous, and consists of magnificent vertical columns, which extend the whole height of the cliff, upwards of 300 feet, without a single curve or break. The rock is pale greyish, or purplish, more crystalline than the trachytes near Senafé. Another small hill of the same composition is met with on the road from Senafé to Kishyat. A third, a little inferior only to Kishyat in size, lies across the deep ravine to the south of that hill, at a distance of about five miles. Others are scattered over the surface of the sandstone to the southward near Fokada, and will be mentioned presently. It is by no means improbable that these are all remains of the same great lava flow.

The sandstone below the trachyte on the hill east of Senafé, and that on the other hill to the south, may possibly be distinct from the massive Adigrat sandstone, but there is no difference in mineral character of any importance. Beneath Senafé rocks no sandstone can be traced, just as beneath Akúb Teriki. Kishyat appears to rest on sandstone.

The great mass of Sowera requires no special description. It consists of rather coarse sandstone, white in colour, with brown ferruginous bands here and there. Other similar great plateaux to the westward correspond with it—that of Tsaro, between the Komayli ravine and that of the Haddas, and the southern portion of the Halai plateau west of the Haddas. All of these consist of massive horizontal beds of sandstone, and are bounded by huge precipices. They are, in fact, great flat-topped spurs, projecting from the mass of the table-land, and separating the different valleys.

The fauna of the neighbourhood of Senafé is quite different from that in the pass below, and is fairly typical of that inhabiting the temperate regions of Abyssinia. Some of the mammals, however, as the hamadryas monkey, the spotted hyæna, and the wart-hog,[1] are identical with those found on the sea-coast; others, as the hyrax (*H. Brucei*), the ichneumon (*Herpestes mutgigella*), the klipspringer, and koodoo, extend into the sub-tropical region, whilst a few appear peculiar to the highlands proper. Amongst these, the principal are the jackal (*Canis variegatus*, Rüpp.), the hare, apparently an undescribed species,[1] and the striped ground-squirrel (*Xerus leuco-umbrinus*). The latter I subsequently met with in the Anseba valley, but it does not appear in the passes below Senafé at a lower level than about 6,000 feet.

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[1] As I did not shoot this myself, nor see it close enough to be quite sure of its identity, I am not certain of the animal being the same.

I obtained a good series of the birds. Of the Raptores, falcons were scarce, with the exception of the kestrel; of eagles, *Aquila rapax*, closely allied, both in appearance and habits, to the "wokab" of India, was abundant, and the noble "Bateleur" (*Helotarsus ecaudatus*) was occasionally seen soaring at a great height, its long pointed wings, pure white beneath, contrasting with its black body. The beautiful white-breasted buzzard (*Buteo augur*) was far from rare. Around the camp kites (*Milvus migrans* and *M. ægyptius*) and vultures (*Gyps Rüppelli*) abounded, and the Abyssinian lämmergeyer (*Gypaëtos meridionalis*) was perpetually hovering or sweeping with his powerful flight around the rocks. Although much inferior in size to the lämmergeyer of the Alps (*G. barbatus*), being two feet less in the extent of the wings, he is a noble fellow, the rich orange underparts and white heads of the older birds rendering them no less conspicuous than their size. Around the camps, not only at Senafé, but in many other places, they were very numerous, and by no means timid. Several were shot on the ground. Indeed, the difference from a country like Western Europe, where all wild animals are relentlessly persecuted, to one of those favoured regions where they are allowed, with but few exceptions, to live unmolested, is nowhere more conspicuous than in the numbers and comparative tameness of the raptorial birds. Bruce relates an instance of the boldness and rapacity of a lämmergeyer in seizing meat actually being cooked, which exceeds anything I heard of.

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[1] *L. tigrensis*, sp. nov. See the description hereafter.

I noticed no owls, parrots, or woodpeckers at Senafé, and the only barbet was *Pogonorhynchus undatus.* I never met with any cuckoo, nightjar, roller, or kingfisher. The Abyssinian representative of the Alpine swift (*Cypselus æquatorialis*) abounded at the back of Senafé rocks. *Irissor erythrorhynchus* was common in small flocks on Akúb Teriki. Near Senafé I first met with the great Abba Gamba (*Bucorvus abyssinicus*), that most astounding of birds, belonging to a group exceptionally framed for a life in trees, and in general purely frugivorous, but itself dwelling on the ground and feeding on insects. *Tockus Hemprichii* (*T. limbatus* of Rüppell) also occurred, replacing *T. flavirostris* of the passes, which at this season did not ascend so high. Three sun-birds were met with, *Nectarinia affinis*, the superb *N. Tacazze*, and *N. cruentata*, the last rare.

Lanius humeralis was the common shrike, *Laniarius erythropterus* being far from rare in the bushes. I occasionally saw that curious dull-coloured flycatcher *Bradyornis chocolatina*, besides the little *Platysteira pririt.* The Abyssinian thrush (*Turdus simensis*) abounded, and *T. olivacinus*, a bulbul (*Pycnonotus arsinoë*), *Crateropus leucopygius*, and several *Drymœcæ* were met with. Amongst the chats, *Saxicola lugens* and *S. isabellina* were exceedingly numerous; *S. œnanthe* was less common; *S. lugubris* kept much to rocky places; *Thamnobia melæna* was not rare amongst bushes on hill-sides. Of pipits, *Anthus sordidus* was met with on barren slopes, *A. cervinus* in ploughed fields, and *A. campestris* in meadows; whilst only two larks occurred, both apparently undescribed species, a *Calendrella* and an *Alauda*. The only crow was *Corvus affinis*. The starling group was represented by two species of *Amydrus* (*A. Rüppelli* and *A. albirostris*), and by *Buphaga erythrorhyncha*, there being at this season no *Lamprotornis* on this part of the highlands, although later *L. chalybæus* abounded. *Hyphantornis Guerini* in winter dress, *Estrelda minima*, *E. phœnicotis*, *Crithagra striolata*, and the common Abyssinian house-sparrow (*Passer Swainsoni*) were the principal finches, though a few rare species were also obtained.

Pigeons and doves were numerous; *Columba guinea*, *C. albitorques*, and *Turtur lugens* all being common. The guinea-fowl, *Numida ptilorhyncha*, was just as abundant as near the coast. Two francolins, *F. Erkelii* and *F. gutturalis*, were common, and *F. Rüppelli* was shot, but at a somewhat lower level only. A large bustard, doubtless *Otis Rhaad*, was once killed, but I did not myself meet with any of the family. Of waders, *Chettusia melanoptera* (the common Abyssinian plover) and *Ibis Harpiprion carunculata* were the only species frequently seen; and the Egyptian goose, *Chenalopex ægyptiaca*, was the sole common representative of the duck tribe, —but there was but little water in the neighbourhood.

Life at Senafé was on the whole very enjoyable. A perfect climate, fine scenery, a novel fauna, agreeable companions, and a good commissariat, combined to make the time pass pleasantly. The whole country around appeared perfectly safe, and the people thoroughly friendly, so far as I could see, and they were certainly an improvement on Shohos both in manners and personal appearance. Still they are a poor race, often half starved, and very inferior to the dwellers in the rich valleys of Central Abyssinia.

After I had been a few days in Senafé, Sir Robert Napier's well-known order was issued, that all servants except grass-cutters for the horses should be dismissed, and only seventy-five pounds of private baggage be carried forward by each officer. Personally, of course, I could travel as lightly as anybody else, and if I renounced all attempts at collecting any specimens, either geological or zoological, I might have still gone on and examined the geology. But I thought that after I had succeeded, with great difficulty, in bringing collectors and all the necessary apparatus to the highlands, it would be a pity to take them no further than Senafé, and I accordingly wrote to head-quarters, then near Antalo, and applied for additional carriage. Meantime Captain Carter, the energetic head of the Trigonometrical Survey, had reached Senafé, and intended going to Takonda and Halai. He asked me to accompany him, and I was very glad of the opportunity of seeing so classical a region as the head of the Taranta pass, traversed by all the earlier explorers of Abyssinia.

We were to have started on the 26th February, but a disturbance arose between some of the Tigréan troops in the neighbouring villages and the followers of a rebel chief, who had endeavoured, *more Abyssinico*, to annex territory, and it was considered by Major Roome, the political officer, not advisable that a small party should leave the camp until matters were quieter. However, next day everything was again peaceable, and we started. The road led over the shoulder of Akúb Teriki by a path composed of huge blocks of stone, then along a terrace-like flat, and across a saddle dividing two great valleys, one running to the Komayli pass, the other into the Hamas valley, a feeder of the Mareb. The latter afforded a superb view, being bordered with huge precipices of sandstone and trachyte, the heights fringed with juniper forest. The juniper generally grows freely on the sandstone, and its deep sombre cypress colour contrasts finely with the white of the rocks.

I found Carter, who had started before me, upon a rise beyond the saddle, hard at work with a plane-table mapping the hills around. My mules detained us, as, although only very lightly laden, their loads, owing to the badness of the saddles and the want of skill amongst the drivers, slipped off as usual at every little ascent or descent, so that we did not reach our camping-ground till dark. It was a bitterly cold night, and in the morning the little meadow on which our camp stood was white with hoar-frost.

The next day was spent on the great sandstone plateau between the Komayli and Haddas valleys. This is, like

Sowera, uninhabited except in the rains, when Shohos drive their cattle here for pasture. Pieces of Greek ruins lie scattered about here and there. We could, however, only find fragments of inscriptions, containing two or three letters at the most. There was no such view now over the deep valleys as when I ascended the sides of the same plateau from Undul. All below our feet was a dense sea of mist, from above which the higher hills rose like islands and promontories. The spring rains which fertilize the coast of the Red Sea still prevailed in the lowlands; they however do not extend to the Abyssinian plateau, and the rains of summer are similarly confined to the highlands.

In the evening we saw several hyænas, but I could not succeed in shooting any. The next day we went to Halai, over a series of low ridges and valleys, with a few bad descents. It was a rather long march, and we did not ourselves arrive before nightfall, having delayed much by the way. At one village on the road we found a Catholic church, with a number of the highly-coloured pictures of saints and of Biblical incidents so common in smaller churches in France and Italy, but also with some of the mural paintings generally found in Abyssinian churches, St. George and the Dragon being conspicuous as usual.[1]

Halai is a considerable village, built of flat-roofed houses, like all others in this part of Tigré, and inhabited by Christians. There is a good-sized square church.

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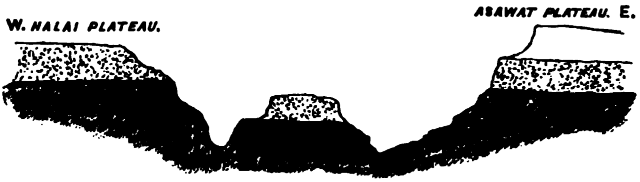
[1] It is scarcely necessary to remind the reader that St. George is as muc the patron saint of Abyssinia as he is of England.

The head-man was very civil, and sent us some supplies. We spent a couple of days here, Carter mapping, I working at the geology and collecting. The village is near the head of the Taranta, which, if the information obtained by Carter's interpreter was correct, is not the name of a mountain, but of the well-known steep pass leading from the Haddas valley to Dixa.

The whole plateau around Halai is composed of metamorphic rocks, as is the northern part of the great Tsaro spur to the east of the Haddas gorge; sandstone comes in south of Halai, near the village of Dhera, and south of this, as far as Takonda, caps all the higher portions of the plateau, the intervening valleys being cut into the subjacent metamorphic rocks. The southern portion of the Tsaro or Asawat plateau, east of the Haddas, is an unbroken mass of sandstone like Sowera. The greater portion of the sandstone is white and massive, bands of conglomerate occasionally occurring, sometimes with a brick-red matrix, ferruginous bands being common.



In the Haddas gorge a ridge capped with about 300 feet of sandstone occurs in a peculiar manner. It is at a much lower elevation than the same rock on the plateaux on each side, its top being about 1,500 feet below their level. It divides two streams: one the main source of the Haddas, running from close to Takonda; the other a side valley, up which is the pass to Takonda from the Haddas. This sandstone cap, the top of which is far below the base of the sandstone on the hills at both sides, extends to the north beyond the termination of the sandstone on the plateaux. It is thus clear that the somewhat abrupt northern termination of the sandstone on the plateaux is not due to faulting, but the intervening ridge has much the appearance of being let down by two great faults, one along each of the valleys at its sides. It may however owe its existence to the sandstone being deposited on a very uneven surface, and filling a pre-existing hollow in the metamorphic rocks at this point.

There is, however, another instance south of Takonda, in which the sandstones appear to be thrown by a fault. On the hill, just south of the village, there is a thin cap of sandstone resting on metamorphic rocks. Immediately south of this is a deep valley, on the opposite side of which the sandstones appear in a narrow terrace, about 500 feet lower than their position on the north side, although they are horizontal in both places. The isolated block, already mentioned as occurring to the west of the road from Senafé to Rahaguddy, is a third case. All of these may be due to deposition on the irregular surface of the crystalline rocks, but in the two former instances, at least, faulting appears more probable. As a general rule, however, the absence of all signs of geological disturbance in the sandstones is remarkable, since they must be of older date than oolitic, as will be shown in a subsequent page.

We marched back towards Takonda on the 2d March, as we found that to go on to Dixa involved a very difficult descent, and we could see the town from near Halai. On our return, we took a more western road, and came to the edge of the plateau, from which there is a steep descent to the west, into the valleys around Dixa.

Near Anakonda, west of Takonda, the surface of the sandstone consists of a hard white argillaceous rock. From the edge of the plateau in this direction there is a fine view, chiefly over a metamorphic country, but sandstones are seen to the north-west, and to the south-west are the extraordinary hills near Adowa, said to be of trachyte. In the centre of the undulating plain, which stretches away to the Adowa range, is a remarkable isolated pillar-like hill, called Tawhili, which lies about west by south from Takonda, at a distance of nearly twenty miles, and, judging from its form, is probably also of trachyte. This is the more interesting as it serves to some extent to indicate a connexion between the hills of Adowa and the remarkable rocky crags at Senafé.

We had found the march from Takonda to Halai so long and tedious that our mules had not arrived till nearly nightfall, owing, of course, in great measure to the frequent halts necessary for the purpose of readjusting loads. On our return journey we halted half-way, in a lovely valley, with fine sandstone cliffs at the sides, a running stream of beautifully clear cold water, a broad expanse of turf in places, and, in others, along the edge of the stream, some of the finest juniper trees I saw in Abyssinia. Both here and close to Halai these trees grew with a luxuriance unusual elsewhere. Some of them, near our camp, served as the roosting-place for a great flock of guinea-fowls. As soon as it was quite dark, a couple of hyænas came to drink at the stream close by our tent. The night before, at Halai, one of these brutes had seized a goat which was tied up, and broken his jaw, and after being driven off had returned, and severely wounded a pony, tearing open his thigh. The boldness of the Abyssinian hyænas is remarkable; they appear to think nothing of tearing or attempting to tear pieces of flesh from the sides of living animals as large as a mule or pony. On this occasion, however, it being bright moonlight, I went after one fellow, and by good luck put a bullet through his neck, dropping him on the spot. It is always more by accident than anything else that one succeeds in killing an animal by moonlight. No plan I ever tried—and I have tried many—really enables a sportsman to see along the barrels of his gun, except in the unusual circumstance of the moon being in such a position as to be reflected from the rib between the barrels. This once happened to me in India: I went after a bear, who came close to my tent at night, and catching by chance the moonlight on my barrels, I shot him through the heart with as much certainty as in daylight.

The next day we marched to Takonda again, and thence into Senafé. We had run out of commissariat supplies, but guinea-fowls, hares, and partridges were abundant, and we shot sufficient not only for ourselves, but to a great extent for our camp.

At Senafé I received an answer from Colonel Dillon, the military secretary to Sir R. Napier, telling me to purchase any carriage I wanted for specimens, as none could be supplied by the Transport Train. For some days I could obtain no mules, as none were brought for sale. At last I succeeded in obtaining three. Drivers were equally unprocurable, unless I took Shohos, who were sure to be missing after two or three stages, perhaps taking the mules with them; however, my Indian horsekeepers tried their hands at mule-driving, and, the little Abyssinian mules being really very manageable, they succeeded pretty well.

It was thus the 17th of March before I could start for the front. By this time the head-quarters were close to Ashangi, and, as we then supposed, within two or three marches of Magdala. But the information, so far in the rear as Senafé then was, of the progress of head-quarters was most scanty, and all sorts of rumours prevailed. Had the march forwards from Antalo been as leisurely as that from Senafé and Adigrat, there would still have been abundant time for me to reach the front before the army could arrive at its goal; but lately the progress had been much more rapid.

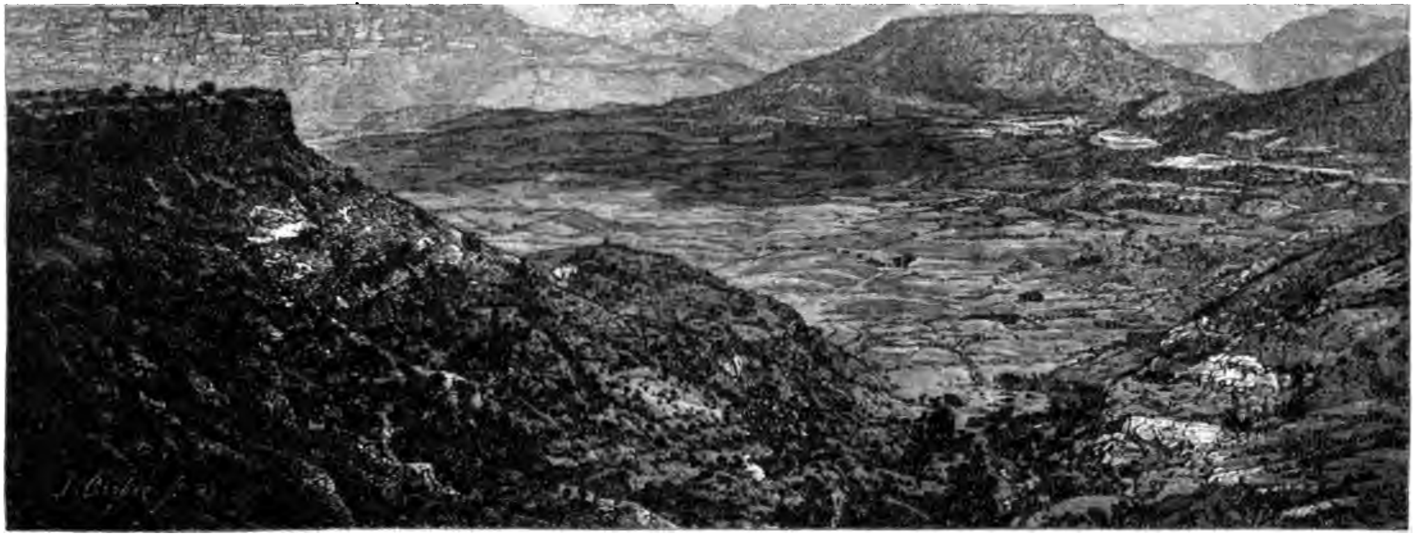
It was, of course, of the greatest importance to me that I should see as much of the country as possible, in order to be able to form a clear idea of its geology. I certainly had no idea, even at this period of the campaign, that its end was so near, and I believe that my expectations that a portion at least of the army would remain in Abyssinia throughout the monsoon were shared by a large majority, if not by the whole, of the expeditionary force. As will be seen, I left just in time to catch the force before Magdala.

Leaving Senafé, the road traverses a plain of metamorphic rocks, excessively slaty for the most part, and showing very little crystalline structure. To the west is a range of hills capped by sandstone; to the east the slaty and schistose formations form rounded masses, between which flow the small streams which form the heads of the valleys running towards the Salt Plain near Amphila. There is but little of interest on the road until it approaches Guna Guna, twelve miles from Senafé. Here the sandstone scarp to the west approaches nearer to the road, and in a small cleft in it is the shrine of St. Romanos, where lie his bones and those of his companions. The spot is a very lovely one: a little stream runs through a ravine with precipitous sides, the bottom filled with magnificent trees. A little farther, the road enters the valley of Guna Guna, with its flat bed of rich turf surrounded by magnificent sandstone precipices, half-way up one of which is a church cut in the rock.

I stayed here a day examining the sandstones, which are precisely similar to those of Sowera, and in which I could find no traces of fossils. I shot a sparrow-hawk, which I subsequently found to be a fine old specimen of the rare *Accipiter unduliventer* of Rüppell, and I also, for the first time, saw that remarkable African bird, the coly. The species was *Colius leucotis*, peculiar to the Abyssinian highlands. They were in small flocks in thick bush. On the sandstone cliffs a large finely-coloured lizard (*Stellio cyanogaster*) abounded. In order to obtain specimens I was compelled to shoot them, as otherwise they were soon beyond my reach.

I had to return to Senafé for a day to make some arrangements, and I did not finally leave Guna Guna till the 21st. The 3d Dragoons were also marching to the front, and their baggage and commissariat rather encumbered the narrow road. Captain Roddy of the Punjab Transport Train was also passing through in charge of a detachment of mules loaded with spare ammunition. I rode on with Captain Newport of the Commissariat, who was on his way to take charge of the station at Adigrat.

From the valley of Guna Guna the road, inclining slightly to the west, rises by a steep ascent to the sandstone plateau, here very narrow, and forming the dividing ridge between the streams running to the Nile valley and those flowing into the Salt Plain. Right and left of the road deep ravines are cut through the sandstones into the metamorphic rocks. The scenery is very grand, and increases in beauty near Fokada. Here several hills of basalt and trachyte rest upon the sandstone, the former being bedded. Some small hills west of the road are distinctly terraced, and although of but small size they appear to consist of two or three beds. Close to Fokada there is a fine hill of columnar trachyte east of the road; the rock of which it is



VIEW OF THE PLATEAUX AND VALLEYS WEST OF FOCADO.

[illegible]

composed closely resembles that of Kishyat, being finely crystalline, and grey or pale lilac in colour. It is very probably a portion of the same great flow as Kishyat; but the trachyte at Fokada unmistakeably rests upon basalt, which again overlies sandstone. The basalt is minutely crystalline, and dark greyish-green in colour. This hill of Fokada tends very strongly to connect the traps of Senafé with those to the south near Adigrat.

Where the road winds round the western side of the great trachyte hill, the view over the valleys to the westward is one of unusual interest and beauty (see Plate III.). The valleys, as usual, are deeply cut into the metamorphics; the flat hill-tops are of sandstone. To the southward, above the sandstone-bed, rise the terraced trap hills of the Harat range. In the far distance are the strangely-shaped hummocks of the Adowa mountains.

While traversing this part of the road I was suddenly surprised by hearing the most hoarse and guttural of croaks that ever issued from a bird's throat, and looking upwards saw two or three of the remarkable thick-billed carrion crow (*Corvultur crassirostris*) sitting with vultures on a tree, over the carcase of a camel. This curious bird was comparatively rare and local in this part of Tigré, but I subsequently saw it abundant on the high plateaux of Lasta. It has a singular and by no means prepossessing appearance, with its disproportionate bill and the curious white patch at the back of the head.

Close to Fokada I also first met with that lovely representative of the starling group, *Lamprocolius chalybæus*, which, later in the year, abounded in this portion of Tigré. Every day, indeed, as we marched through these beautiful highlands, new kinds of birds and animals were noticed. But little could be collected, as there was no time to hunt for specimens.

The camp at Fokada was beautifully situated at the south side of the great trachyte hill, and at the head of a deep ravine in the sandstone leading to the eastward, the resort of many lämmergeyers, eagles, vultures, and kites. *Corvultur* was also common. On the next day I marched to Adigrat. The road lies along the eastern scarp of the Harat range, and is, for the greater part of the distance, upon basalt, the band of sandstone being at a lower level; but there is a descent to the sandstone again before reaching Adigrat. To the east are the usual deep valleys between hills capped with sandstone; to the west rise the massive spurs of the great Harat range.

Time did not allow of my exploring the Harat hills, either when marching to Magdala or when returning, and I could only examine the lower portions. These consist of basalt alone, frequently amygdaloidal, in well-marked horizontal beds, the terracing so characteristic of trap rocks being most strongly marked, even more so than in the trap ranges of Western India. From my subsequent experience of the ranges in Lasta, I have but little doubt that the upper portions of the Harat hills are largely composed of trachyte flows, and many of these appear to be of great thickness. One, forming a cap with perpendicular sides on the top of the two highest peaks of the whole range,—the ambas, or hill forts, of

Alekwa and Andale,—looks from a distance as if it could not be less than 200 feet thick; probably it is more.

Adigrat itself stands on the sandstone terrace at the base of the traps. It is a considerable town, with a fine church, containing some remarkable mural paintings, in which Scriptural scenes are portrayed, as they might have appeared, perhaps, had the scene been Abyssinia and the actors Abyssinians, just as the Italian painters of the Middle Ages introduced the costumes of Italy and the great buildings of Florence and Sienna in the representation of events which occurred in Palestine.

On the road, a few miles north of Adigrat, numerous large rolled blocks of granite lie scattered about, apparently derived from the sandstone. This is the only instance I noticed of the occurrence of rounded granitic blocks on the table-land.

As far as Fokada, all the Abyssinian dwelling-places seen had been square, with flat roofs like those at Senafé, and usually built against the slope of a hill; but about Adigrat we came upon the round huts with conical thatched roofs, which appear to be the prevalent form throughout Central Abyssinia, for no great change took place between this and Magdala. The difference may be partly due to the heavier rains further south—mainly, however, I was told, to the paucity of grass for thatching in Agamé. The round thatched huts are certainly far better adapted to keep out rain.

At Adigrat I left a collector and a peon, with instructions to obtain for me skins of as many mammals and large birds as they possibly could, Captain Newport kindly taking charge of the men. I diminished my own kit as much as I could, and re-started the following morning, taking with me only one of my native collectors, a very good skinner, but lame, so that I had to carry him on my spare horse as long as I had one.

From Adigrat to the next camping-ground to the south, Mai Wahiz, the road runs upon the sandstone terrace, and for the first twelve miles it continues to skirt the great range already described. This range terminates to the south in some noble spurs, with very precipitous sides of horizontal trap, resting upon sandstone; and the road then emerges into a more level country than any previously traversed. The sandstone belt is continuous all the way from Senafé, and nearly horizontal throughout, although never apparently much above 800 to 1,000 feet in thickness.

Between Adigrat and Mai Wahiz is the highest part of the route in Tigré, the road being at one spot, about half-way between the two camps, upwards of 9,000 feet above the sea. I here first met with a little black and white *Pratincola*, much resembling the common *P. caprata* of India, but with more white about the male, and a more rufous female. This bird, although far from scarce, appears to have escaped the notice of all previous naturalists in Abyssinia, until described by Von Heuglin in 1869 as *P. semitorquata*. I also here first saw and collected the beautiful little green parroquet *Psittacula Tarantæ*, found by Mr. Salt, and described in the Appendix to his "Journey."

Hitherto, from Senafé, the road, where it did not actually run along the crest of the dividing range, kept slightly to the east of it; but from Mai Wahiz, nearly to Lake Ashangi, all the small streams crossed on the route run to the westward into the Nile basin. All are small, the dividing ridge between the two watersheds being only a few miles distant during the whole route until after passing the Takkazzyé.

From the plain near Mai Wahiz, the Haramat ranges near Adowa, so frequently mentioned before in connexion with the Senafé rocks, are very conspicuous, at no great distance to the west.

Just south of the camping-ground at Mai Wahiz, a conspicuous basalt dyke crosses the road. It is curved, but has a general north-west strike. Trap dykes, as a rule, however, are rare throughout the country traversed. Some fragments of iron ore, evidently containing manganese and resembling psilomelane, were here met with, evidently derived from the sandstone, being only a peculiar form of the ferruginous bands which occur so frequently in it.

About four or five miles south of Mai Wahiz there is a small sandstone scarp, down which the road descends to a lower plain, chiefly consisting of metamorphic rocks, of which a large expanse to the westward is composed, while to the eastward the sandstone range continues to the parallel route. The road traverses metamorphics till past Adabági, the next camping-ground, and nearly as far as Dongolo. The general strike of their foliation is north and south, as near Senafé, varying about 10° to the east or west. South of Adabági the sandstone range falls back to the eastward, leaving a wider plain of metamorphic rocks in that direction.

At Adabági my progress was very nearly brought to a stop by all my mules knocking up. The Otago saddles which I had, though fairly adapted for horses or very large mules, were quite unsuited to the little Abyssinian animals, and galled their shoulders and hips fearfully. Hundreds, if not thousands, of mules were utterly ruined by these saddles during the campaign. One animal of mine was so lame from a shoulder-gall that I was obliged to leave him behind, and the others were unable to carry their loads for a day or two. In this emergency I loaded my horses, and Captain Roddy, having some spare animals in his train, very kindly carried a load for me for a day or two until my mules recovered. I subsequently procured Punjab packs, consisting of two cushions, united by a band over the back, and on which the loads, first packed in canvas bags, called *saletas* in India, are lashed with a rope; and with these the mules got on well enough. Unfortunately the loads had a great tendency to shift, and required constant adjusting on the road, but my men soon became fairly expert at mule-loading.[1]

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[1] I believe that every one who had experience in mule-carriage utterly condemned all the various saddles used in the Abyssinian expedition. My own experience was the following:—

The "Otago" saddle, though heavy and cumbersome, is suitable for roads without many steep ascents and descents, provided it be fitted to the animal carefully; those sent to Abyssinia were, as a rule, too large for mules. On steep roads, from being hard and stiff, it presses too much against the shoulders and hips. The Bombay pad was simply ridiculous. The Punjab pad was by far the best form used, for small animals especially, but it was difficult

Leaving Adabági, the road for some miles traverses the undulating metamorphic tract. To the west, a few miles distant, are some massive isolated crags, evidently of sandstone, no longer horizontal, but tilted up at a considerable angle. About eight miles from the camping-ground a steep scarp is met with, down which the road descends to the valley of the Genfel. The whole descent is over metamorphic rocks, but just beyond the base sandstone comes in, resting upon the metamorphics, and dipping at a sharp angle, about 25°, to the south-west. This sandstone is evidently a continuation of the crags, composed of similarly-inclined beds, already seen to the westward from the top of the descent.

The valley now reached, in which stood the camping-ground of Dongolo, offered a great contrast to the somewhat barren table-land from which we had just descended. A small stream runs through the bottom, which is richly covered with trees and bushes; and the massive bluffs of sandstone, of a rich red colour, not white, as farther north, almost recall some of the scenery in the old red sandstone of Western England. Despite

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to strap the load firmly if the shape of the latter was at all inconvenient. That any success was achieved by the Transport Corps was due to the sheer hard work of the officers, and especially of those on the highlands. The muleteers, as a rule, were abominable. The Punjabees were manageable, but knew nothing of mules; the Egyptians knew something of mules, but were difficult to manage; and the Persians, by far the best muleteers in the army, were few in number, and disgusted at finding no one who could understand them. Indeed, nearly the whole difference in respect to management between the unruly Turks, Egyptians, and Persians, and the easily-managed Punjabees, lay in the simple fact, that nearly all the officers of the Transport Train spoke Hindustani fluently, and could converse with the latter, whilst, not understanding Arabic, they could not make themselves intelligible to the former.

the difference in colour, I consider this sandstone identical with that left behind at Adabági, but the question will be discussed in a subsequent page especially devoted to geology. In this valley the beautiful iridescent starling (*Lamprocolius chalybæus*) abounded, and many birds reappeared which had been wanting on the bleak plateau we had traversed from Adigrat. From this point the general elevation of the road as far as Antalo did not much exceed 7,000 feet above the sea.

From Dongolo we marched the same afternoon to Agula, the next camping-ground. The road passes through a beautiful little glen in the sandstone, at one side of which is a church cut in the rock. Immediately on leaving this, the sandstone distinctly dips under limestone, and the road enters a large open plain with hills to the eastward. It traverses the level ground for four or five miles, and then ascends a somewhat barren rise, still keeping on limestone, which indeed was traversed from this point for upwards of seventy miles, and until we had passed Antalo. In this limestone I at last found fossils, but they were extremely obscure. A few oysters of the *Exogyra* type, and some spines of Echinoderms, were the only remains I could recognise. Casts of bivalves were common enough, but they, of course, were useless for determination.

Not only was the geology of much interest, but several birds which I had not previously seen attracted attention. I shot a pair of a handsome sand-grouse, which I afterwards found to be a Cape species, *Pterocles gutturalis*, and a specimen of the long-tailed dove, *Œna* *capensis.* This little dove, which in May and later abounded on the sea-coast, appeared in winter and spring to be entirely wanting, not only on the shores of the Red Sea, but throughout the portion of Tigré which I traversed north of the Genfel river.

Between hunting for fossils and looking after birds time slipped away. I had already been detained in consequence of one of my men having been badly kicked by a mule, and I had put my lame collector on a horse which Captain Roddy had lent me to ride, and sent him on; so when night came on, I was alone, and still at some distance from camp, and I had no little difficulty in finding my way through the darkness. The road was far from good, and after blundering over rocks for half an hour, I was glad to see the camp-fires of Agula. An excellent plan had been adopted of pitching a large tent —large, that is, for Abyssinia; in India we should have thought it very small—at each halting-place, for the use of officers marching through. I had scarcely reached this refuge when a downpour of rain accompanied by heavy thunder and lightning burst upon us, and lasted for at least an hour. Hitherto the weather had been lovely, but afterwards showers fell not unfrequently.

Near Agula are the ruins of a church,[1] described by a correspondent of the *Illustrated London News* as a Greek temple. The scenery around is very characteristic of this part of the country, a comparatively open valley with very little vegetation on the slopes, but a fringe of green bushes along the banks of the stream. The hills on each side of the valley ascend in a series of small limestone scarps.

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[1] A description with a plan will be found in Markham's "Abyssinian Expedition," p. 236.

Leaving Agula next morning, March 26th, the road led over long ascents and descents through an undulating country almost entirely composed of limestone. The rock is in comparatively thin beds, much resembling lias, but lighter in colour. The high dip seen near Dongolo disappears immediately beyond, and the rock is horizontal or undulating, without any steady dip in any direction. The country is covered with thin jungle of mimosa bush. I had no better success than the day before in fossil-hunting, but I had not much time to search; there was a long march of sixteen miles from Agula to the next camping-ground, Dolo.

The limestone evidently extends for a long distance east and west of the road. Some hills about eight or ten miles east of Agula may perhaps be of sandstone, but the crags of the Geralta range run almost due west from Dongolo, and the ground seen to the westward from Agula must consist almost entirely of limestone, into which the various streams traversed by the route of the expedition at Dongolo, Agula, Dolo, &c., cut deep gorges before uniting to form the Geba river, a great affluent of the Takkazzyé. This stream doubtless exposes a most interesting section of the rocks in this country.

About eight miles from Agula the road dips into a small valley, where is a halting-place, called Mai Makdam. At this spot an important pass from the Salt Plain to the eastward joins the route we followed, and we here found several dealers with loads of the oblong blocks of salt used by the Abyssinians instead of small change.

On reascending from the valley at Mai Makdam, basalt is seen in a hill east of the road. A very much larger mass occurs close to Dolo, and the greater part of the rock over which the road descends into the valley at the camping-ground consists of it. The first knoll has the appearance of resting on the limestone, but the second is of such thickness that if regularly interstratified it would be seen on the hills around. It is probably an intrusive mass.

At Dolo I found Lieut. St. John busily engaged in putting up the telegraph. He gave me one or two birds which I had not myself found, amongst them the little Abyssinian bustard, or, as Indian sportsmen very naturally called it, floriken (*Otis melanogaster*). It is a little larger than the common floriken of Southern India (*O. aurita*), but has very similar habits, living amongst bushes and high grass, usually crouching and seeking to hide when approached. As in the Indian bird, the male of this little bustard changes in plumage with the time of year, the whole of the under-parts becoming black in the breeding season. There are other small African bustards, forming the genus *Lissotis* of some naturalists, which exhibit the same peculiarity, and the close affinity between these African and the Indian birds is very interesting, for this type of bustard does not belong to the desert fauna, and its existence in both countries is one instance amongst several showing that the very marked

Ethiopian relations exhibited by a large portion of the fauna of British India do not arise solely from the extension of the desert types to the sandy plains of North-Western Hindustan, the Punjab, and Sind.

In a ramble next morning I found a small boss of granite exposed in the bed of the stream just above Dolo. It is of small size, extending apparently only a few yards; and as no sandstone occurs, it is evident that the limestone, here at least, rests immediately on metamorphic rocks. Above and below the stream has cut its way through limestone, forming deep glens with cliffs at each side. In the bushes beside the stream I shot a coucal or crow-pheasant (*Centropus monachus*), and St. John killed a rail (*Rallus Rougeti*). We made the march to the next camping-ground, Haikhallat, near Chelikot, together. It was over undulating limestone country, similar to that already traversed. Harriers (*Circus cineraceus* and *C. Swainsoni*) abounded, much as in the Deccan in India, but they were even more numerous. I was desirous to procure more specimens of *Otis melanogaster*, and we beat several patches of bush without success, but we started two reddish antelopes, one of which we succeeded in rolling over. It was a buck of the *Scopophorus montanus* of Rüppell, with short straight horns. Another bush antelope, which we also saw this day and of which I afterwards killed specimens, was *Cephalophus madoqua* of the same naturalist, a mouse-coloured animal about the size of a gazelle, or rather smaller.

On the limestone there were a few land-shells. A snail closely allied to the common South European *Helix* *pisana* covered some of the bushes and the aloe plants, and I found two or three small species of *Pupa*, but, as usual, only very few kinds occurred.

We rode on the next day, the 28th March, to Buya, near Antalo, over very similar country. Several patches of trap occur, the mode of occurrence being in general rather obscure, although some of them are clearly interstratified in the limestone. No dykes were observed. The town of Antalo lies three or four miles west of the route followed by the army, on the side of a hill, a portion of which evidently consists of sandstone, and which is very probably capped by trap. The plain to the east of Antalo, in which stood the camp of Buya, is very extensive, and mostly covered by black soil, resembling the "regur" of India. The camp was one of the most important depôts of the army, and a considerable body of men were stationed here, with large commissariat and other stores. I never could understand by what remarkable *lucus à non lucendo* principle of nomenclature this camp, like the corresponding station at Adigrat, was always spoken of as *entrenched*, because it was surrounded by a wall of loose stones. I do not at all wish to ridicule this apparently very trifling defence; it was behind no better that a whole army was kept at bay for weeks by a few determined men at Cawnpore, in 1857; and even the famous defences of the Lucknow Residency were not much more formidable; but the name appeared to me singularly inappropriate. On the same principle a walled city should be one surrounded by a ditch—*e.g.* Calcutta.

At Buya I heard that the army was but little beyond Lat, about six marches ahead; but it was still supposed to be but two or three marches from Magdala. I halted for a day, buying a couple of fresh mules to replace those which had broken down. One of the new ones objected to be saddled. I obtained the assistance of some Egyptian muleteers from the Transport Train, and they very soon put a Punjab pad on by main force, three or four powerful men absolutely holding the mule down while a couple of others strapped on the pad.

The next day, March 30th, I re-started, and made a double march to Meshek, thus catching up Captain Roddy's mule-train once more. The first part of the march to Musgi is over country composed of limestone, precisely similar to that traversed north of Antalo. Interstratifications of trap are very frequently seen, and one in especial occurs close to the camping-ground at Musgi. A small stream emerges from the little plain in front of the camp, through a narrow gorge in the limestone, which is here horizontal, or nearly so. The stream, almost immediately after leaving the plain, cuts into a bed of basalt underlying the limestone, and this basalt forms the channel of the stream for a considerable distance. It has a very low dip, about 2° or 3°, to the west. The whole of the beds are then cut off by a fault striking 15° west of south, with an upthrow to the west; and the same bed of trap, about 100 feet in thickness, is seen on the hill-side, with limestone both above and below it.

I had ridden to Musgi with my mules; but thence

I sent them on, and remained some time examining the rocks. When I re-started, I missed the road, and soon found myself wandering amongst hills. I came to a village, and succeeded somehow in explaining that I wanted a guide, and moreover in inducing a man, for a dollar, to show me the way ; and he took me back into the proper route before nightfall, at the spot where it entered a deep valley, with fine trees and a running stream. Up this I rode for some miles in the dark, till I reached the camp at Meshek, where I found a party of friends wondering at my absence.

Meshek is a lovely spot. A small grass plain, with a few scattered willow-trees, looking as if made for a camping-ground, occupies a rather wide portion of the valley. Above, there is cultivation, irrigated by the little stream in the bottom of the glen; below, dense forest. The hills at the side are composed of sandstone and limestone, capped by trap. The sedimentary beds are greatly disturbed; near the camp they are, in places, even contorted or vertical. In this part of the valley the beds appear to be higher in the series than the mass of the limestone about Antalo, and sandstone and conglomerate prevail to a much greater extent than elsewhere. These rocks are dark in colour, and far less pure than the sandstones of Adigrat and Senafé; and I have scarcely any doubt of their belonging to a different series altogether. The general dip is west or south-west. I found a few very ill-preserved fossils in one place.

We had now left the comparatively open plains of Tigré, and entered the deep valleys between the rugged spurs of the Lasta mountains. The road had been much less carefully made south of Antalo, and in many places it had suffered from the traffic, and was but little better than any ordinary Abyssinian mule-track. Leaving Meshek, the route led for two or three miles through the bottom of the little valley, now brilliantly green with the young wheat, and then, after passing a large round church, with a conical thatched roof, one of the finest met with on our march, it commenced a steep ascent over trap rocks, which form all the upper portion of the valley. There is an appearance here of two distinct series of traps, the lower slightly inclined and resting immediately on the sedimentary beds, the upper, which forms the crest of the pass, distinctly horizontal; but the presence of two series is not so manifest as in the next valley. Above the crest of the pass, itself 9,800 feet above the sea, towers the amba or hill fort of Alaji, the stronghold of Walda Yasous, nearly 1,000 feet above the road. The whole of this amba is formed of horizontal beds of trachyte and basalt.

On this pass I had first occasion to notice the change which takes place in the vegetation of the Abyssinian mountains at altitudes above or about 9,000 feet. A gigantic thistle, ten or twelve feet high, and a very fine species of heath, often large enough to be called a tree, are two of the most conspicuous plants above this elevation. A corresponding alteration takes place in the fauna, but this was less conspicuous in the Alaji pass than subsequently on some ranges of greater height.

From this point to Magdala the whole route is over bedded volcanic rocks; the subjacent limestones, sandstones, and metamorphic rocks never once emerging from beneath the great trappean formations.

From the crest of the Alaji saddle there is a fall of about 1,500 feet to the valley of Atala. The greater portion of this descent is over horizontal beds, mostly basaltic, a few only being trachytic; but at the bottom of the valley, just east of the ground occupied by the camp, is a small ridge of basaltic beds, dipping at an angle of 35° or 40° to 30° south of west. These evidently belong to a lower series, upon which the horizontal beds rest unconformably, and to which the inclined beds seen in the Meshek valley also belong. Up the Atala valley to the eastward all the beds are horizontal, like those forming the crests of the hills.

At Atala a large body of Abyssinians, men and women, were assembled. The women, many of whom were not ill-looking, though their beauty might have been greatly heightened by the use of water, were all dressed in a long shift of coarse cotton, and had their hair closely plaited. The men wore the usual toga-like shama, and carried spears and shields. All were much excited. The women were crowded together in the centre, one or two of the eldest and shrillest leading a sort of song, to which the others kept time with much howling and lamentation. The men, evidently much excited, stood around. On inquiry we learned that this was an Abyssinian indignation meeting. The poor people had carried stores for the commissariat, and had been paid, but Walda Yasous or his followers had taken from them a considerable proportion of the money. The women apparently were endeavouring to excite the men to resistance. Unfortunately, in this, as in many other cases, want of knowledge of the language and of a good interpreter made it impossible to obtain accurate information.

The narrowness of the path across the passes rendered progress very slow upon these marches, as the mules could, of course, only go singly, and one animal falling, or halted for the adjustment of its load, stopped the whole convoy. The dragoons, with their long train of commissariat supplies, had been in the rear since Adigrat, but by forced marches they also had come up, and so much delay was caused by the great length of the united convoys that our party, which had reached Atala from Meshek early in the day, went on over the next spur to Aiba in the afternoon. The Aiba valley is higher than that of Atala, but otherwise precisely similar, an open grassy flat at the bottom with a stream running through it, and hills bare of trees at each side.

The Atala and Aiba valleys recall most forcibly some of the scenery in the higher parts of the western ghâts near Poonah, in the Bombay Presidency; and the hill forts of Alaji and Daga, although grander and higher, yet resemble to a certain extent the old Maratta strongholds of Singhur, Rajghur, Torna, &c. In each case the same geological peculiarity, the occurrence of beds of volcanic rock, which weather with a vertical scarp, has been employed for purposes of defence, both by Hindoos and Abyssinians.

At the bottom of the Aiba valley, as at Atala, the lower series of traps crop out, inclined at a considerable angle, and they are traceable to some height south of the valley, the horizontal beds resting quite unconformably upon them. The two series are so similar in general character, that in the hurry of travelling to the front, although I noted the dips, I attributed them to local disturbance, and it was only when returning that I clearly distinguished between the two separate groups of beds. Nevertheless the evidence, when examined, was found to be very complete.

At Aiba I first saw and shot a dwarf goose peculiar to Abyssinia (*Bernicla cyanoptera* of Rüppell), which I subsequently found abundantly on the higher plateaux, and which appears only to be found at considerable elevations. On the passes around I saw a bunting (*Emberiza cæsia*) and a serin (*Serinus* or *Crithagra nigriceps*) which I had not previously met with.

I left Aiba on the 1st April, and ascended the long slope leading to the Ferra pass. From the top of the inclined traps, about 300 or 400 feet above the valley, to the crest of the pass, 10,500 feet above the sea, or 1,500 above the valley, and again from that to the immense amba of Daga, at least 1,500 feet more, the whole mass of the mountain consists of massive horizontal beds of dolerite and trachyte. The latter appears to prevail, especially in the higher part of the pass, and in the amba above, and it is conspicuous by the much more distinct vertical scarps which mark its outcrop. It is pale in colour, very often brecciated, some beds being apparently in great measure composed of volcanic scoria and ash, but at the same time highly crystalline, and frequently abounding in beautifully-formed crystals of glassy felspar with rounded angles. These crystals, from their brilliancy, are very conspicuous on the broken surface of the rock.

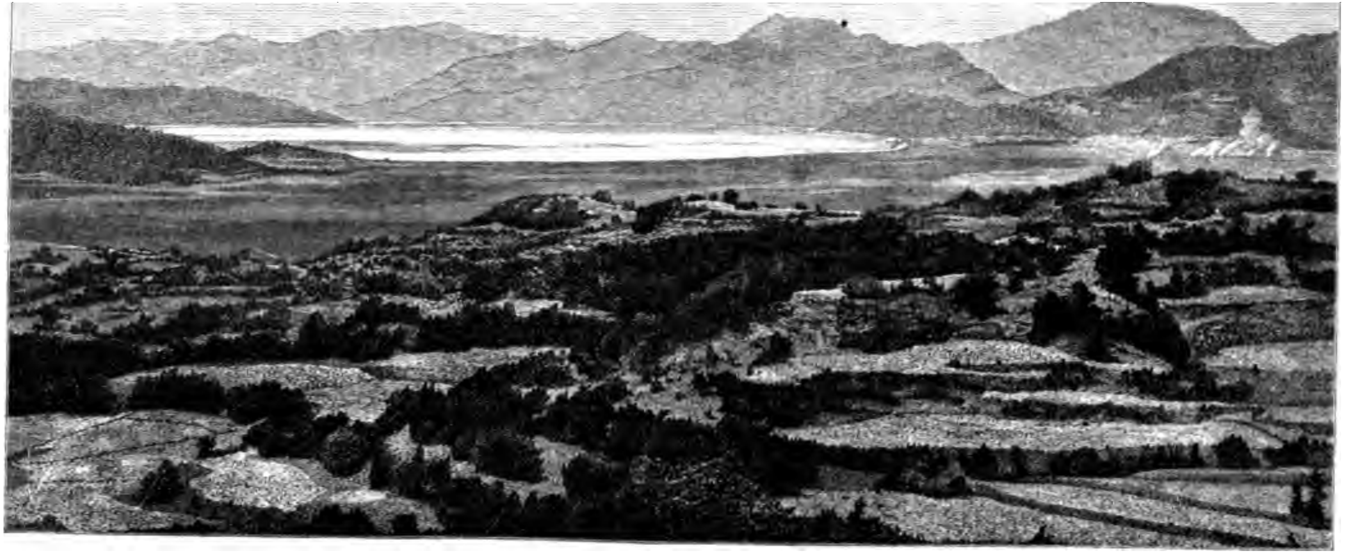
The general effect of the scenery is depicted in the frontispiece, a view of the Daga amba from the south, showing the horizontal beds of trachyte.

At the summit of the Ferra pass all the hills are covered with a peculiar wiry grass, which appears to be peculiar to the trachytic traps.

The path descends from the saddle to the camping-ground at Belago, situated at a very considerable elevation. Here the inclined beds of trap reappear, and hence occupy all the country till far beyond Lake Ashangi, with the exception of the top of some of the high ranges north-west of the lake. From Belago to Makhan the road for some distance proved uninteresting. After one steep descent it passed along a flat valley to Makhan, the next camping-ground. Here we were once more on the eastern watershed, and continued east of the dividing ridge until after crossing the Wombarat pass near Lat.

The pass between Makhan and Ashangi is not so high as those further north, and does not appear to rise above the top of the inclined traps, or Ashangi group, as I propose to call them. The road passes through a superb forest of junipers, in which the plantain-eater was abundant. Except around Meshek I had not noticed this beautiful bird lately, doubtless in consequence of our road having traversed open country. Ferns abound, and the large heath attains magnificent proportions, the climate

PLATE IV.



VIEW OF LAKE ASHANGI, FROM THE NORTH

(From a Photo.)

on the eastern side of the dividing range at this elevation being probably damper than on the west.

At the crest of the pass we came in sight of the lovely little Lake of Ashangi. From the same spot there is an extensive view to the eastward over the country of the Asubo Gallas. The foreground consists of finely-wooded hills, all apparently of inclined beds of trap. Beyond, at a distance of twelve or fifteen miles, there is a broad valley, probably 2,500 or 3,000 feet below the pass, or about 6,000 feet above the sea. Beyond this, again, are other rounded hills, which look as if more thinly wooded. They may perhaps be metamorphic. From the summit of the pass the road descends rapidly to the beautiful Ashangi valley, over beds of amygdaloidal basalt.

I only halted for a night at Ashangi, and as I passed some days here on my return from Magdala, I abstain from description of it for the present.

At Ashangi I heard that the army was close to Magdala, and might return at any moment; also that the fortress was much farther than we had hitherto believed. Although I had but little faith in any immediate return, still, as I found I could only push on by leaving all *impedimenta* behind, I left at Ashangi my last collector and my tent, and went on with only my horses and one mule to carry provisions; for the commissariat stations here were often three or four marches from each other, and no food, except for the animals, could be obtained at the intermediate stages. I then started, still with the mule convoy, and made a double march to Lat.

The road led round the western shore of the lake to the southern end, and then traversed a broad, fertile plain of black soil, in which stood the camping-ground of Masagita. On the lake-shore were an unusual number of swallows and martins, amongst which the peculiar black *Psalidoprogne pristoptera* was conspicuous. Leaving the plain of Masagita, our road ascended a wild, narrow valley, at the entrance of which we passed a fortified village, surrounded by a strong wooden palisade. This border-land between Amhara and Galla, Christian and Mahommedan, is one of the most disturbed parts of Abyssinia, and more robberies and murders of camp-followers took place about Ashangi than in any other portion of the route. From the valley the road ascended to a stretch of flat ground at about 10,000 feet, the summit of the Wombarat pass. Here I was caught in a violent hailstorm, and had to find the best shelter I could behind a rock. The rain, after about an hour, abated, and I rode down to Lat, the path being so slippery that my horse came down with me more than once. At Lat I put up with a friend, Captain Smith of the Commissariat, but the rain recommenced, and in the middle of the night a violent gust of wind blew down our abode, a light single bell tent. This was pleasant; we were of course sleeping on the ground, and were soon wet. Bell tents are very useful in some respects; they keep out rain very fairly as long as they stand; but in a high wind they are about the most useless invention conceivable. The little pegs used have no hold, and pegs of proper length are too heavy to be carried, as the tent requires so large a number. The little tents used on the hills in India are lighter than bell tents, much easier to pitch, and afford far more security against bad weather.

At Lat we found Major Grant and Captain Moore, who had been sent back by the Commander-in-chief to expedite the arrangements for the carriage of commissariat stores to the front. The Transport Train had, from the very commencement of the campaign, proved quite inadequate by itself to perform this service, and native carriage had been very largely employed. As far as Atala all had worked smoothly, and the stores had been pretty regularly delivered; but between Atala and Ashangi, and still more beyond Ashangi, trickery and oppression on the part of some of the petty chieftains had caused a complete breakdown in the system, and had not Gobazye's chieftains afforded a most unexpected amount of assistance to the officers of the Commissariat in procuring supplies, the army would have fared far worse than it did. As it was, there was always abundance of food, though it only consisted of tough beef and inferior flour.

From these officers we at last learned something definite as to the route in front, and the great passes still to be surmounted. They had quitted the head-quarters camp at Santara, on the Wadela plateau, six marches of various lengths beyond Lat, and Magdala was still four or five marches farther. When the fortress would be reached was still uncertain, but we might still be in time to witness its fall. It was amusing, with reference to this subject, to hear the reports which circulated from post to post. The mail letters were carried by cavalry picquets, and the men were always eagerly questioned for news. For a long time the belief in all the camps in Tigré was, that Magdala would be reached and assaulted on the 25th of March, and some of the Indian sowars actually told us that it had been captured on that day, long before the news could possibly have reached them. Afterwards, the 6th of April was the appointed date. As is well known, the place did not fall till the 13th.

From Lat the road ascended to the crest of the Dafat pass, which is not so high as that of Wombarat. Hence again there is a fine view both to the south, over the valleys of the Tellari river and its feeders, and to the eastward, over a portion of the same great valley in the Asubo Galla country, which was seen from the pass north of Lake Ashangi. All the country around Lat, as far south as the Abuyameda range, between the Tellari and Takkazzyé valleys, consists of the lower group of traps. These traps are more or less inclined, usually at low angles, but occasionally, as just west of Lat, with high dips. In this case the angle is 45°. The general dip is to the south.

From the Dafat pass the road descends into a well-wooded valley. I met here with a small herd of monkeys (*Cercopithecus griseo-viridis*), which are not often seen at quite so high an elevation. I also met with two doves, *Peristera afra* and *Turtur semi-torquatus*, Rüppell, usually met with at a lower horizon.

From Marawa, the camping-ground beyond Lat, to Dildi on the Tellari, here a very small brook, was a long march of sixteen miles over a series of steep ascents and descents, forming one of the most fatiguing marches of the whole route. Of the convoy of mules and ponies with which I marched from Senafé to Magdala, more animals fell from exhaustion and had to be abandoned upon this march than on any other. All the animals were half starved; grain alone had been procurable at most of the halting-places we had recently passed, and the poor beasts were left night after night without grass or hay. Even our horses, for which we could usually purchase grass from the Abyssinians, were getting thin.

The character of the valleys about Marawa and Dildi is different from that of any previously traversed. The country is a network of wooded glens, without any large range. All the sides of the valleys show signs of agriculture, all have evidently been cleared in patches, and cultivated for a season or two, and then abandoned, a common system in wild countries, where the land is largely in excess of the wants of the population. Bushes and trees spring up again in the abandoned fields, but grow in plots, which still show the limits of the clearing. A peculiar appearance is thus given to the landscape; from a distance it almost looks as if the sides of the valleys were covered by fields with hedges, as in England.

At Dildi there was a comparatively large camp, much baggage having been left here. I started the next morning with Captain Arbuthnot, an aide-de-camp of Sir R. Napier, intending to make a double march and reach the Takkazzyé. The road from Dildi ascended a steep incline to the crest of the Wandaj pass, 10,500 feet above the sea. This pass crosses the Abuyameda range, the flat-topped masses of which, right and left of the pass, rise to 12,000 feet or more. All the upper portion of this range consists of the higher group of traps, horizontal as usual, and with the strongly-marked vertical scarps characteristic of the trachyte beds, which, however, at the pass itself, are less numerous than elsewhere. A peculiar feature near the crest of the pass is the presence of very many large dykes of basalt, which weather more slowly than the rocks around, and stand out in relief like gigantic walls upon the hill-side. Their direction varies considerably ; some of the most prominent run nearly north-west and south-east.

The vegetation at the crest of this pass is rendered striking by the abundance of the remarkable *Tupa rhyncophetalum*, a great spike of leaves, not unlike those of tobacco, on the top of a high stalk. I here first saw one or two birds, such as *Pratincola sordida,* and the black and yellow weaver bird, *Euplectes xanthomelas,* peculiar to high altitudes. *Nectarinia Takazze* was common, and the large francolin, or spur-fowl, as it was called in the army, *F. Erkelii,* abounded. The ground at the summit of the pass was burrowed in every direction by a peculiar kind of field rat, *Mus abyssinicus* of Rüppell.

Before reaching the summit we were overtaken by heavy mist and rain, and it poured nearly the whole afternoon. It was dangerous to go on; the path down was too slippery for the animals to keep their feet; they had already slipped down more than once, and a horse of mine had nearly fallen over the steep hill-side on the way up, while the descent to the south was represented to us as much steeper, and with a precipice beside it. The carcases of mules and horses showed how many had fallen on this ascent. I had no tent; Captain Smith and I had arranged to march to the front together, and to use his tent, which was the lightest, but he had been detained at Lat. However, I found shelter with a friend. The heavy rain continued nearly all night, a high wind blew, and it was bitterly cold, and I came out in the morning expecting to find some, both of the poor Indian camp-followers, who had been out in the rain all night, and of the animals, dead with cold and wet. To my surprise, none seemed to have suffered. As no grass had been procurable, the animals were all turned out to feed on the fine wiry herbage of the mountain, and I sent my horses with them. I had but one man to look after two horses and a mule, and whilst he was bringing back the latter, which had strayed slightly, a chestnut Arab, which I had hitherto ridden, and a very docile useful animal, disappeared. After a short time I discovered its tracks, and, only waiting to get a gun, followed them. The tracks of a man leading the horse were plain: he had stolen the beast, and led him round the hill, keeping just out of sight of camp, and had then gone to the westward. After a mile or two I lost the tracks amongst a number of others, and had to give up the chase. Of course I never heard anything more of my horse. Such thefts were common, and several officers lost horses. To complete my misfortune, whilst I was searching for the horse my saddle was also stolen from camp.

After delaying the search until I had only just time to get down to the Takkazzyé by nightfall, I started, and walked down the steep incline, leading my remaining horse, who carried my bed, &c. It had begun to rain again, but half-way down the weather cleared up, the rain-storms evidently keeping much to the higher ranges. There was a camping-place half-way down at Muja, but I went on to the bottom, 3,000 feet below Wandaj, crossed the Takkazzyé, here a small stream, and caught up the party with Roddy's mule-train once more at the camping-ground.

On the next day we ascended the steep road leading to Santara on the Wadela plateau, and thence went on to Gaso, another camp twelve miles further. There is no very distinct stratification in the Takkazzyé valley; and as I did not clearly make out the distinction between the two groups of traps till after passing it on my return from Magdala, I omitted to notice if the lower series occurs there. Almost without doubt it must do so, but the road reascends to the horizontal trachytic series on the great scarp south of the Takkazzyé.

The march from Santara to Gaso, and thence to Yasendyé and Bethor, led across the Wadela plateau,[1] at first at an elevation of at least 10,500 feet; subsequently, south of Gaso, at a somewhat lower level, Yasendyé and Bethor being about 9,500 feet above the sea. In the northern portion, from Santara till about six miles south of Gaso, all the rocks exposed consist of trachyte and trachytic ash, containing large blocks of black jet-like obsidian, which some of the soldiers took for coal. They soon found out their mistake when they tried to burn it. The scenery is very peculiar. Hummocks of grey rocks covered with lichens stand up from amidst the fine wiry grass already mentioned as occurring on the high passes of Ferra and Wandaj, and alternate with small marshy flats, the soil in which is an imperfect peat. The fauna is mostly different from that of lower elevations. The handsome white-breasted buzzard (*Buteo augur*), the dwarf goose (*Bernicla cyanoptera*), and the caruncled ibis (*Harpiprion carunculata*), are very abundant. A duck found also at lower levels (*Anas flavirostris*) occurs in the streams and marshes. Two peculiar chats (*Saxicola frenata*, Heugl. and *Pratincola sordida*), the yellow-throated pipit (*Macronyx flavicollis*), a species of finch allied to the canary bird (*Crithagra nigriceps*), a wattled lapwing (*Lobivanellus melanocephalus*), and, above all, the red-legged chough (*Pyrrhocorax alpinus*), are peculiar and characteristic forms. The Abyssinian lämmergeyer and the thick-billed crow (*Corvultur crassirostris*) were also frequently seen. Mammals were scarce; the only conspicuous one was the little *Mus abyssinicus*, which was most abundant on the higher parts of the plateau.

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[1] In fact, all the northern portion belongs to the district of Dalanta, and only the south-western portion, from Gaso to Bethor, to Wadela.

Several of these birds disappear below 10,000 feet on the portion of the plateau near Yasendyé and Bethor, where the rocks exposed are chiefly basaltic, and, as is usual under such circumstances, a black soil prevails, evidently highly favourable to the growth of cereals, and widely cultivated. The wild grasses are quite different from those on the trachyte.

At Yasendyé I was surprised at seeing the white and black crow (*Corvus scapulatus*), which I had never before met with since leaving the flat coast region near Komayli. Here it associated with *Corvultur* and *Corvus affinis.*

I had walked the long march from Gaso to Yasendyé, the greater portion through pouring rain. On my arrival, however, I was most hospitably received by my old friend Major Bardin. The next morning I determined to ride my remaining horse with an Otago saddle, taking only a rug with me by way of bed, but on mounting the animal I found he was lame. Major Bardin very kindly lent me a pony, but I did not make much progress.

The road from Yasendyé to Bethor is precisely similar to that north of the former place, over an undulating plateau, with much cultivation and long grass. In one or two places before reaching Yasendyé, deep ravines, exposing cliffs of basalt, had been seen to the left of the road, and a couple of miles beyond Bethor we came suddenly on the brink of the mighty chasm in which the Jitta river runs, and to which all the minor valleys converge.

Of all the grand scenery met with in Abyssinia, none equalled this wonderful gorge. It is 3,500 feet deep, and looks scarcely a mile across. The sides are extremely steep, in places nearly perpendicular. The horizontal beds on both sides appear to correspond exactly; half-way down there is a well-marked terrace, evidently formed by the same bed, on both sides of the river. The bedding is very distinct.

It is to be regretted that all those geologists who disbelieve in the power of running water, and appeal to such *Dei ex machinâ* as marine action and waves of translation, cannot see a few such marks of the handiwork of rain and rivers as are shown in these gorges. There is not the slightest possibility, so far as I can see, of explaining their origin by any other force than that of the streams flowing in them. Any faulting or dislocation of the rocks is out of the question, there is no evidence of glacier action at any past time, and even the most fervent apostle of marine denudation would scarcely credit it with the formation of a Titanic trench three-quarters of a mile deep and very little more in breadth.

At the bottom of the ravine ran a beautifully clear stream in a pebbly bed. Some of our party pushed on to the Dalanta plateau; I remained for the night with Captain Roddy in the valley. The temperature at the bottom, only 6,000 feet above the sea, was a most agreeable change from that of the bleak plateau. On the following morning, having the loan not only of a pony but of a saddle also, I considered myself fairly equipped once more, and started for Dalanta. The ascent, like the descent of the previous day, was by the road which King Theodore had constructed for the transport of his artillery to Magdala, a broad path, at least twenty feet wide in most places, and thoroughly cleared, but excessively steep in parts—a wonderful record of the man's perseverance and intelligence, though not of his engineering skill. The section exposed by the road gave an excellent idea of the rocks. The majority are basaltic; a little columnar trachyte occurs near the summit north of the ravine, and on the south side, just below the top of the scarp, the following beds occur in descending order:—

1. Compact basalt.
2. White argillaceous rock of sedimentary origin, twenty to twenty-five feet thick.
3. Volcanic ash and basalt.
4. Coarse brown sandstone, fifty to sixty feet.
5. Trachyte with crystals of glassy felspar.
6. Basalt.

The sedimentary beds can be traced by the eye for a short distance along the scarp, the sandstone being very conspicuous, but they have evidently no great extension, as they do not recur on the north side of the ravine. Below the above, about half-way down to the river, some black shales are interstratified in the traps. I could find no organic remains, but fossil wood is said to have been met with here.

The road from the Jitta to the Bashilo crosses a portion of the Dalanta plateau, which is even flatter than the Wadela, and consists, like the southern portion of the latter, of basaltic rock covered with black soil, and mostly cultivated. After traversing this for about six miles, we reached the scarp of the Bashilo ravine, even deeper than that of the Jitta, but less striking, because not so abrupt; the opposite side, instead of being one immense unbroken cliff like that on both sides of the Jitta, being cut up by ravines and of unequal height. Opposite to us rose the fortress of Magdala,[1] the scarp surrounding which looked small at this distance, and dwarfed by the higher flat-topped hills beyond. On a ridge to the right, the two British camps were conspicuous, that of the 1st Brigade on the Arogyé spur, and that of the 2d Brigade a little nearer and lower. These heights had been occupied the evening before, and the smart skirmish which ensued with Theodore's army had been distinctly seen from Dalanta; but although the flashes and smoke of the small arms and steel guns had been clearly distinguishable, the only sounds heard were those made by Theodore's large cannon, fired from Fala.

I descended the steep road to the river, over rocks similar to those seen in the Jitta sections, but without sedimentary interstratifications; and, reascending the opposite hills, reached the camp at Arogyé before evening. This was on Saturday, the 10th of April, the evening on which the prisoners were released. I had marched from Senafé, with only one day's halt, in twenty-three days, and, of course, anything like a careful examination of the country was out of the question.

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[1] It is as well to mention that the accent in this word is on the first syllable. Magdála is incorrect. This is mentioned by Markham also, but the false accentuation has been very generally adopted.

It is quite foreign to the purpose of the present work to describe the capture of Magdala, which took place two days after my arrival. The remarkable good fortune which crowned the expedition was far less favourable to scientific inquiry than to military renown; for the subsequent rapid retreat to the coast, however brilliant as a military manœuvre, entirely prevented me from examining the country in any detail.

All the hills around Magdala appear to be of horizontal traps, chiefly basalt, although trachyte also occurs, and the plateau of the fortress itself consists of the latter rock; the steep surrounding scarp, which would have rendered the place so difficult of capture had it been defended, being the ordinary form of outcrop, already alluded to as characteristic of the trachyte beds. Interstratifications of white shale, much hardened as if by lava-flows, were met with in two or three places around Arogyé, and were especially noticed close to the camp of the 2d Brigade; but no organic remains could be detected in them.

The camp before Magdala was certainly the most unpleasant abode in which I found myself in Abyssinia. The whole force was crowded into the smallest possible space, in small thin tents, not nearly large enough even to hold the men; the only food was inferior flour and tough beef, and it was difficult to obtain sufficient water to drink; washing was a luxury only to be occasionally attained. It was decidedly worse than at Malkatto. Water there was scarce, but a swim in the sea was always a resource available; and there was no crowding;

while as regards the Commissariat, I can only say that I wish it had a depôt in many of the wilder parts of India, and that I were entitled to draw rations as in Abyssinia. I have often fared far worse in India, with all the resources of the country at my command. It is not surprising that all the troops at Magdala, who had for two months been working hard, and for at least a month been faring hard also, were delighted at the prospect of leaving the country.

I, on the other hand, was disgusted at being unable to advance farther into Abyssinia. Above all, I had hoped to have thoroughly explored the great lake of Dembea or Tsana, which has never been accurately mapped. I believe that there are few geological problems more interesting than those connected with the origin of lake basins, and those of Africa, the only great lakes in the tropics, are of peculiar importance. But Sir Robert Napier would not listen to any proposals of exploration. He even refused permission to Mr. Munzinger to go into the country of the Asubo Gallas, although one of the principal chiefs had guaranteed his safety, and although Mr. Munzinger's long experience and great knowledge of the Abyssinian people would have alone been almost sufficient to secure him from injury. A few days after leaving Magdala, in order to leave no means untried, I applied to be allowed, with a small party, to go to Lake Tsana, and thence march to the south-west towards Gondokoro, endeavouring to explore the Sobat river, but without any success. Sir Robert was determined to have every European over whom he could in any way exercise authority out of the country in as short a time as possible.[1]

I left the camp before Magdala on the 16th of April, three days after the fall of the fortress, and marched back as rapidly as I could to the Wadela plateau. Here I halted for a day or two to obtain a few specimens of the birds, of which, however, I could not collect many, as I had to prepare the skins myself. At Yasendyé, Mr. Markham, the Honorary Secretary of the Geographical Society, who had been with the expedition from the beginning, but whom I had never met till I reached Magdala, came up from the front with Major Grant. He had no hope of penetrating any further into the country, and was on his road back to England. He left with me an aneroid and a boiling-point thermometer, in case I should be more successful.

From Yasendyé I came on to Gaso and Santara. I had some days previously written to Ashangi for my tent and collecting apparatus to be sent on, as I wished to procure specimens of the birds and mammals peculiar to this elevated region. I found, however, that my tent, &c. had not arrived, and that the whole camp had been removed from Santara to the Takkazzyé except the tent of the guard. There was no place in which to remain, for the guard-tent was of course crowded, and very reluctantly I was compelled to leave this most promising ground with only about seven species of animals not obtained elsewhere. These comprised a peculiar hyrax, the little *Mus abyssinicus*, *Saxicola frenata*, *Pratincola sordida*, the rare *Lobivanellus melanocephalus*, *Macronyx flavicollis*, and *Euplectes xanthomelas*. Had I been able to devote more time to the exploration of these hills, I might doubtless have increased the number considerably, and have obtained a larger proportion still of the peculiar forms described by Rüppell and Von Heuglin from the mountains of Samyen.

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[1] I do not for an instant doubt that Lord Napier was not only perfectly justified in refusing permission to any one to leave the line of march, but I fear so little interest is taken in England in any exploration for other than purely commercial motives, that he would have been blamed had he permitted any.

This being out of the question, however, I pushed on to Lake Ashangi. On my road I obtained two or three more specimens of birds on the top of Wandaj, including *Falco tanypterus*, which I had frequently seen before but never secured. I also saw *Hypotriorchis concolor*, the slate-coloured merlin, of which I did not secure a specimen. Close to Dildi I shot one of the mouse-coloured antelopes, *Cephalophus madoqua*.

The released prisoners from Magdala were on their march towards the coast, and I met several of them, amongst them Dr. Schimper, the veteran naturalist, who has passed forty years in exploring the botany, zoology, and geology of the country. He was a fellow-student with Agassiz, and having remained so long away from European changes of thought, has retained the geological ideas of a past generation, differing from those of the present less perhaps in reality than in nomenclature, so that I found some difficulty in understanding his views. Although, so far as I am aware, he has published nothing himself, he has supplied many successive travellers with information, and has indirectly contributed more perhaps than any other living European in making the fauna and flora of the Ethiopian highlands known to the scientific world of Europe.

I reached Lake Ashangi[1] once more on April 29th, and remained there for seven days, collecting. Lieut. St. John had lent me an india-rubber boat, which was most useful, as no native craft of any kind existed on the water. The amount of astonishment which the boat produced amongst the Abyssinians was naturally great. The lake swarmed with water-birds, but many kinds of ducks had left. I saw the shoveller, always one of the latest to migrate to the north, and shot the crested pochard (*Fuligula cristata*), but there appeared to be decidedly fewer than when I passed on my way to Magdala a month earlier. The Egyptian goose (*Chenalopex ægyptiaca*) occurred in large numbers. The most abundant bird on the lake was the crested grebe (*Podiceps cristata*); I also shot the eared grebe (*P. aurita*), which was scarce, and the common dabchick (*P. minor*). A small cormorant (*Graculus africanus*) was occasionally met with, and I once saw a white pelican, which, however, I failed to secure. The crested coot (*Fulica cristata*) was tolerably abundant. The umbre (*Scopus umbretta*) occurred on the margin of the lake, with a large black and white ibis, of which I failed to obtain a specimen. In the marshes on the banks *Rallus Rougeti* and *Gallinula chloropus* occurred, and snipe abounded. Flocks of *Ibis carunculata* consorted with the Egyptian geese on the meadows around the lake, but both had become very wild, owing to their being so frequently fired at. The spur-winged plover (*Hoplopterus spinosus*) was met with occasionally in the same places or along the shore.

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[1] A brief description of this lake will be found in a subsequent page in the part devoted to the Geology, Section I.

Amongst the high grass which grew in places near the lake I found, rather to my surprise, large flocks of the black and yellow weaver-bird (*Euplectes xanthomelas*), which elsewhere I had only seen at much greater elevations. On the stunted trees, the beautiful long-tailed roller (*Coracias abyssinica*) was far from rare, and the iridescent starling (*Lamprocolius chalybæus*) was frequently met with. Amongst the other birds here collected were *Pratincola semitorquata*, Heug., *Turdus olivacinus*, Bp., *Bradyornis chocolatina*, *Cotyle cincta*, and *C. minor*. I also obtained a single specimen of the secretary bird.

The meadow in which the camp stood was dotted over by heaps of earth, exactly like mole-hills, thrown up by *Bathyergus splendens*, a burrowing short-tailed rodent, the size of a large Norway rat, but resembling in appearance the bamboo rats (*Rhizomys*) of the Himalayas and Burmese countries. I kept one alive for two or three days, feeding it on roots of grass, but it finally escaped. There were unusually few jackals and hyænas. A few koodoo were said to occur in the neighbouring hills, and I found the tracks of pigs and otters along the shore of the lake. There were a few land-shells to be found, *Bulimus Olivieri*, a species of *Vitrina*, and an *Ennea*, the two latter undescribed, being the most common. Despite the large number of fish-eating birds on the lake, all the Abyssinians persisted in denying the existence of fish in the waters. I only saw one small kind, but the occurrence of otters alone serves to indicate the existence of some larger forms. I could catch none, however.

The head-quarters, now the rear-guard of the army, reached Ashangi on the 5th and left on the 6th May, abandoning such stores as could not be carried with them, and making a bonfire of huts, empty packages, all the hay not wanted, &c.; 400 or 500 mules and ponies which were either lame or seriously galled, so that there was no probability of their being made of service during the return journey as pack animals, were also abandoned, and a great scramble took place amongst the Abyssinians for their possession. The scene was most amusing. Crowds of the poorer Abyssinians hung about the camp, picking up anything they could, and by no means disdaining to pilfer if a chance afforded. Now and then a few would be driven off, and the whole would take to flight for the moment; soon returning, however. As each corps in succession moved off its ground with its baggage, these people crowded into the abandoned space to search for anything which might have been left behind, and they might be seen carrying off the most singular articles,—empty packages, broken Otago saddles, or fragments of canvas, blocks of firewood, and bundles of grass. A similar scene took place at every camp, varied occasionally by some valuable commissariat stores, such as flour or grain, being left behind for want of carriage, and by a free fight taking place for their possession.

The march back demands but brief notice. Finding it most tedious to march on the narrow steep roads with the head-quarters camp, owing to the lengthy train of baggage—which started generally at daybreak, and the last of which rarely accomplished a march of eight or ten miles before dark—Dr. Cook and I made a double march from Makhan to Atala, and afterwards kept with a small force which marched one day ahead of the Commander-in-chief's camp. We reached Antalo once more on the 11th, and I halted there a day. St. John, who had brought the telegraph thus far, had explored the neighbourhood, and carefully marked down a couple of owls (*Bubo cinerascens*), which inhabited some rocks by the Buya stream, about two miles from camp. Besides killing one of these, I obtained several other rare birds on the same day, amongst them a pair of *Ibis comata*.

As I heard that the head-quarters and rear-guard would only halt for two days at Buya, I left on the 13th May, in order to have, in any case, a couple of days for the examination of the junction of the limestone and sandstone, and to search for fossils at Agula and Dongolo. I could not even spare a day to visit Antalo town and Chelikot. Nothing worthy of record occurred on the road to Agula. The weather had become fine again, and the road being comparatively good and hard there was but little delay in marching. Moreover, all commissariat supplies, and especially grass and grain for the animals, being now abundant, all the mules and horses were rapidly getting into good condition, and much fewer fell or knocked up on the road. Still I frequently preferred allowing the whole camp to go ahead, and marching quietly by myself in the afternoon, so that I could examine the rocks along the road, or shoot any rare birds or animals I might see. This was, I believe, against orders, as there was supposed to be risk of being attacked, but the risk was very small; all that was necessary was to keep the mules in sight, as otherwise they might have been plundered by some of the petty thieves who hung about the route of the army. Much more was related about thieves than was true. Petty pilfering took place everywhere, as amongst all civilized and semi-civilized peoples; but, except in the disturbed country around Ashangi, most of the stories of attacks and thefts were invented by muleteers and camp followers to conceal their own villanies.[1] I can only say, in justice to the Abyssinians, that both in marching to Magdala and in returning I rode or walked the greater portion of the distance either entirely alone or with one or two companions, who, like myself, preferred keeping out of a crowd, and that I never met with anything but friendly greetings from the people who passed. They were especially amicable in Tigré. The usual conversation was something of the following kind :—

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[1] An admirable instance occurred at Undul Wells, when I was staying there. Some muleteers arrived with three or four Shoho prisoners bound, and asserted that these men had attacked them, and had attempted to rob their mules on the road. The Shohos, on the other hand, declared that they had been conveying stores from Zulla to Senafé for the Commissariat, and were returning with the money when attacked by the muleteers. On inquiry this turned out to be the case, the money taken from the Shohos was found upon the muleteers. Another trick of the muleteers was to sell stores entrusted to them to Shohos or Abyssinians, and to account for the deficiency by stories of robbery. Undoubtedly a few cases of robbery did take place, but the greater number of asserted instances were, I believe, imaginary.

Abyssinian (producing a small piece of cord, originally blue, now of various colours, from around his neck) : "Christi ?" which being interpreted was supposed to be an inquiry as to the Englishman's Christianity.

Englishman: "Yes," with a nod.

Abyssinian: "Taib" (Arabic for "good," probably the whole of the speaker's attainment in the language).

The blue cord is in Abyssinia the mark of a Christian, and I think there was often some doubt of our really belonging to that religion, since we did not wear it. I met one enthusiastic chaplain, who made a public profession of his faith by conspicuously wearing a blue necktie.

Near Agula I at last found some fairly preserved fossils in the limestone. All were bivalves, but they comprised *Ceromya*, *Pholadomya*, and *Trigonia* of typically oolitic forms, which fully confirmed the opinion expressed by the energetic French travellers, MM. Ferret and Galinier, who first explored these formations. At Dongolo, after much search, I obtained several well-preserved specimens of a small *Hemicidaris*, also with characteristically oolitic affinities.

Instead of following the road from Agula to Dongolo, I went for some miles down the valley of the Agula river, which runs in a deep dell between cliffs of limestone ; and then, crossing the hills to the Dongolo stream, which flows in a similar deep ravine, I returned by it to the road, Sir C. Staveley having allowed me to take a small guard. I was unable, however, to reach sufficiently far to examine the base of the limestone in this direction.[1]

At Dongolo I halted for a day, and was overtaken by the Commander-in-chief's camp and the rear-guard. It had been the intention of Sir Robert Napier that a small party with a guard should be allowed to cross from the Haramat plain near Adabagi to Adowa and Axum, and thence march to rejoin the main body at Senafé; and to this party Dr. Cook, Mr. Holmes the archæologist, the officers of the Trigonometrical Survey, and a few others, including myself, were to have been attached. I was especially desirous of examining the remarkable Adowa hills, reported by some travellers to be of sandstone, but which Dr. Schimper considers of volcanic origin, and which are, as previously remarked, probably identical in composition with the trachytic rocks about Senafé, which they resemble so greatly in form. However, it was found that the length of the march was too great to enable the party, if detached, to rejoin the main body before the latter left Senafé, so the project was abandoned.

I returned with the head-quarters camp to Adigrat and Senafé. At the former place I found that the collector I had left behind had not a large number of bird-skins, though there were many amongst them of interest. He had, however, about twenty specimens of the species of hyrax found in the neighbourhood, which served admirably to illustrate the astonishing variation in the colour and even the texture of the fur which is exhibited by these animals, and which is scarcely equalled, so far as I know, by any other wild mammal.

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[1] Amongst a collection of rock specimens which Dr. Beke has very politely sent to me for examination, I find fragments of both limestone and sandstone from the country farther to the westward in this direction.

We reached Senafé on the 25th May. Very little rain had fallen in this part of the country, and it was consequently less green than in February, and contrasted strongly with the southern portions of Tigré between Antalo and Adigrat. Kassa, the Tigré chief, was encamped in the neighbourhood, and durbars and military exercises by both Abyssinians and British troops were the order of the day.

At Senafé I first met Mr. Jesse, the gentleman sent out by the Zoological Society of London. He had hitherto been most unfortunate, for he had only landed in March, and had been detained in the rear both by want of carriage and by illness. His collections at this period were consequently comparatively small. The collector whom I had left behind at Undul Wells had proved thoroughly worthless, and had found it more profitable to skin birds for some of the officers than to do his own work. Lieut. Sturt, however, had a considerable number of birds, of which he allowed me to take such as I had not myself collected. Altogether, before I left the highlands I had about 900 specimens of birds, mammals, and reptiles, representing above 250 species.

A considerable change had taken place in the avifauna, caused chiefly by the immigration of birds from lower elevations and the departure of the *Saxicolæ*, and some other migratory kinds. Of the immigrants, perhaps the most conspicuous was *Lamprocolius chalybæus*, now abundant. *Tockus flavirostris* and *Laniarius æthiopicus*, which in February and March did not ascend above 6,000 feet, were now common at 8,000.

Senafé, after having been occupied nearly six months, was finally abandoned on the 29th May. We exchanged the pleasant climate of the Abyssinian highlands for heat and dust, a short supply of water, and universal barrenness. As we descended the pass, every day brought with it additional heat and discomfort, mitigated slightly by such European luxuries as preserved provisions, wine, and beer, which had been imported in abundance by enterprising speculators.

In the pass I found that most lovely bird, *Pholidauges leucogaster*, abundant from about 2,000 to 5,000 feet of elevation. It had certainly been entirely wanting in January and February; so conspicuous a bird could not possibly have escaped every one's notice. At Komayli, at the base of the hills, I found some other birds, especially *Œna capensis* and *Nectarinia metallica*, which were certainly not to be found there in February. Both were now breeding. A bee-eater, *Merops albicollis*, had also been added to the fauna; whilst *Cercomela melanura*, *Aëdon galactodes*, and *Turtur albiventris* appeared much more abundant than formerly. On the other hand, all the shrikes, *Saxicolæ*, and wagtails, with *Corvus affinis*, had left.

I remained a few days in Komayli. The heat was excessive; the temperature at mid-day, in a large tent with a double roof, affording almost as perfect protection as a thatched house, being 114° to 115° Fahr. In the afternoon a strong breeze set in from the sea, which slightly abated the temperature. I returned to Zulla on the 6th June, and took up my old quarters in the Commissariat enclosure, one of the best parts of the camp, for, being close to the sea, it was much less dusty than further inland.

Sir Robert Napier left on the 9th for England, and only a small portion of the army remained in charge of the stores which were being shipped. I determined to see the last of the expedition. Six months' campaigning had left me in the best possible health, and I only regretted being obliged to return to a more civilized country. I had arranged to go back to India by one of the steamers which was to remain at Annesley Bay till the last, when an opportunity offered itself of seeing something more of Abyssinia.

Lieut. Mockler had been one of the first officers of the army who landed in Abyssinia as an assistant in the Political Department. During the advance of the army on Magdala, he had remained on the coast in charge of the very important political relations with the Shoho and other chieftains which had been so ably originated by Colonel Merewether and Mr. Munzinger. On the departure of the force he had applied for leave of absence in order to visit the Anseba and Bogos country, a friendly territory lying about one hundred miles north-west of Massowa. Mr. Munzinger, who has passed many years in Bogos, also intended to spend part of the summer there; and when Lieut. Mockler asked me to join the party, the temptation was too great to be resisted. Mr. Jesse the zoologist, who, like myself, was eager to see something more of the country and its fauna before leaving it, joined us; and having purchased from the Commissariat, which was very glad to dispose of them, flour, rice, and grain for ourselves and the men whom we intended to take with us, sufficient for a couple of months, we left Zulla on the 18th June, when it was finally abandoned by the army, and went to Massowa in a steamboat which was despatched to carry Mr. Munzinger thither.

Massowa has been described by almost every writer who has visited Abyssinia. It is a small Arab town on an island about a quarter of a mile from the shore, and without any water. It is probably one of the hottest places in the world, and the change from Annesley Bay was far from agreeable, although we had a house, the British Consulate, to live in, a luxury to which we had all been strangers for many months. I believe we all longed to be in tents again; I did certainly, but three or four days' delay was necessary in order to make arrangements for carriage. A large number of camels had been left behind by the Transport Train; we obtained the loan of some, but as they had no saddles or ropes for loading, we were obliged to procure these also.

All being ready, we left Massowa on the afternoon of the 22d of June, and, crossing the arm of the sea which forms the harbour, rode for about four miles inland to Makullu, a large village whence a great portion of the water used at Massowa is brought, and where most of the Indian and Arab merchants have houses and live during the hot months, going to Massowa in the day only.

The spur of land opposite Massowa, and the island itself, consist of the coral rock of which so many of the islands in this part of the Red Sea are composed. It is formed by the agglutination of broken corals, shells, and coral sand. After leaving the shore a flat alluvial plain is traversed as far as Makullu. Here hills formed of volcanic rocks appear, similar to those near Zulla.

At Makullu we took leave for the time of Mr. Munzinger, who was obliged to remain in Massowa for some days, in order to make arrangements for the care of the transport animals left in his charge. We started early the next morning, and marched about twelve miles due west to Saati, through low hills of volcanic and sedimentary rocks intermixed, all apparently belonging to the same group, and having a general dip to the east. Basaltic lava predominates. The ground is mostly rather barren, stunted mimosa bushes of the most thorny description being almost the only vegetation.

At Saati there is a spring of water, and we halted here for the night. I was rather unwell, having been knocked up by the heat of Massowa, and lame from some unknown cause, so I could not go out. In the evening towards dusk thousands of sand-grouse assembled at the water to drink, coming from all quarters. All appeared to be of one kind, *Pterocles Lichtensteini*, which is common throughout this part of the country.

In other places we subsequently often saw large numbers of this bird flying to water in the evening and early morning, but nowhere so many as at Saati. All sand-grouse have particular hours of the day for drinking, and *Pt. Lichtensteini*, like the closely-allied *Pt. fasciatus* of Hindustan, drinks at twilight in the morning and evening.

In the morning I found large numbers of bunting (*Emberiza septemstriata*) at the water. We started at daybreak, and marched west for about fifteen miles to Ailat. A small outcrop of granitic rocks appears at Saati from beneath the volcanic formations, and the spring is probably brought to the surface in consequence of their existence, the water in the porous scoriaceous rock being dammed back and forced to the surface by the impervious granitoid gneiss. The latter formation, doubtless, underlies the volcanic beds throughout, and probably at no great depth. After passing Saati, volcanic rocks, precisely similar to those further east, are met with for about three or four miles, when metamorphics succeed them; the road traverses low metamorphic hills for a few miles further, and then emerges upon a plain four or five miles broad, in which is the village of Ailat, consisting of thatched huts surrounded by high thorn fences to keep out wild beasts, here numerous.

The plain around Ailat was tolerably green, even at this period of the year; large tamarisk trees grew in places along a broad sandy watercourse which traversed it; and they, with a few other plants, gave the country an appearance of fertility which contrasted agreeably with the barren rocks between which we had been travelling. We crossed the plain, and went on about three miles beyond Ailat to encamp near the famous hot spring. The village, as is usual throughout Northern Abyssinia, is at a distance of two or three miles from water; the cause assigned by the people for this singular practice is, that plundering bands often encamp near the water. Probably the danger from wild beasts, which come down to drink in considerable numbers, is another reason for not living close to the springs. Of this risk we had a most melancholy practical illustration a few days later.

The hot spring at Ailat issues from some rocks in the bed of a torrent, which is dry except after heavy rain in the hills. The water is extremely hot, 140° Fahr., but perfectly tasteless.

I did not go out next day until the evening, when some people saw a lioness close to our camp. Mockler and I went to look for her, and after peering about some time, Mockler saw her in a bush, and fired, but missed. I could not see the animal distinctly. She got amongst some dense green bushes, and, as it was already dark, we were obliged to leave her.

The next morning we took up her tracks; she had been joined by a lion in the night, and had gone to the north. We did not succeed in finding her, however. I killed a large pig (*Phacochœrus*), of which I preserved the skull, and shot several birds, amongst which were *Lamprocolius chrysagoster*, *Halcyon semicœrulea*, and

Centropus superciliosus, none of which I had previously seen. In the evening the lioness again crossed the stream near our camp, and we followed her, but she went away at once. In going after her we saw a leopard, which also escaped.

Ailat is notorious for lions and leopards, many of which are man-eaters, and many people are killed by these animals. It is a most curious circumstance that whereas on the route followed by the army, not forty miles farther south, lions were only seen on two or three occasions, and not a single animal was shot, although there were dozens of sportsmen eager for the chance, at Ailat, and throughout our subsequent journey, we frequently met them; and scarcely a day passed without our seeing their fresh tracks.

The temperature was certainly very hot, rising to about 108° in the day, and falling to 75° in the early morning before sunrise; but this was an agreeable change from Massowa, where night and day the thermometer never fell below about 87° or 88° Fahr. I very soon recovered, but Jesse unfortunately had a rather smart attack of fever, apparently produced by exposure to the sun.

I procured many birds during the six days we remained at Ailat; amongst them were *Nisus niloticus*, *Nilaus brubru*, *Tockus erythrorhynchus*, *Quelea æthiopica*, *Peristera afra*, and *Ægiatilis tricollaris*. I also found some species which elsewhere I had only met at a much greater elevation (Ailat is less than 1,000 feet above the sea), such as *Tchitrea melanogastra*, *Dicrurus divaricatus, Lamprocolius chalybæus, Buphaga erythrorhyncha,* and especially *Irrisor erythrorhynchus, Passer Swainsoni,* and *Hoplopterus spinosus.* Bustards (*Otis arabs*), guinea-fowl, and francolins (*Pternestes rubricollis*) abounded.

On the early morning of the 29th June one of my servants, rising before daybreak, was scratched in the face by some wild animal which had come into the camp. The track resembled that of a large cat. We thought nothing of this at the time, but on the following night we were all aroused by an outcry and shouting, and an alarm was given that a lion had seized one of our men. Mockler fired off his rifle to frighten away the beast, which rushed roaring past our tent. On inquiry we were horrified to find that an Abyssinian servant of Jesse's had been killed while asleep, and no alarm had been created until the animal attempted to drag away the body. The unfortunate man had two large tooth-holes in his throat, and must either have been so seized that he was unable to cry out, or else, as is probable, his neck was broken. The assailant was doubtless a leopard, very probably the same small animal which had scratched my servant the night before. A lion would have carried away the body to some distance, certainly, and the tooth-marks were too small to have been made by a lion's fangs. We had a low thorn fence round three sides of our camp, and the camels occupied the open side—the usual plan in this part of Africa—but we had no fires, a most necessary precaution, and one we never neglected after this sad lesson.

During all my experience in India—and in the course of twelve years I have encamped in many places infested by tigers and leopards—I have never taken such precautions as we had adopted even before this accident. Throughout the progress of the expedition in Abyssinia, no one ever dreamed of the necessity for especial protection against wild animals.

In the morning, all attempts to track the leopard failed; we could not find a single distinct footprint. The poor fellow who had been killed was buried, and a pile of stones heaped over his grave. To have remained at Ailat would simply have been to risk a repetition of the disaster; consequently, after expending the morning in a vain attempt to discover the beast and avenge the death of our poor follower, we packed up and started for Asus, a village about eight miles to the north, of very similar appearance to Ailat, and lying in the same plain, which extends here for many miles along the base of the lowest hills.

The ranges in this neighbourhood rise far more gently from the low country than they do near Annesley Bay. The high plateau of Hamazen, equal in elevation to the country around Senafé and Halai, is visible to the west; but the intermediate ground, instead of consisting of deep, rugged ravines, is composed of rounded hills, drained by valleys of no great depth.

We halted a day at Asus, and then went into the hills again to Kusaret, on the road to Mensa, intending to go to a place called Tunfia, said to be much cooler than Ailat, and situated at an elevation of about

2,000 feet. But at this time we heard from Mr. Munzinger that he expected still to be detained for several days in Massowa, and that we had better proceed to Bogos, by Ain and the Lebka valley, without waiting for him. One of the Naibs of Arkiko was with us, and his presence would be ample guarantee; in fact, the people being friendly, no special protection was necessary.

We were all tired of the heat, and Jesse was for a day or two very ill. We therefore determined to proceed at once to Ain, and thence to a cooler climate. We accordingly retraced our steps somewhat, and then marched to Kanzal, still in the plain running northward from Ailat; but at Kanzal the hills to the east become scattered, and hence, to the northward, one great barren plain extends from the base of the mountains to the sea. This tract is a perfect desert in the summer, though after the winter rains it becomes green, and affords pasture to the cattle of the Habab tribes. The heat and glare in the daytime at the season of our journey were said to be almost unbearable, and it was therefore necessary to make the march across the desert of Shob (or Sha'ab), as this tract is called, at night. We started in the evening of the 4th of July, with a full moon.

Before dark we passed a large encampment of the Warea, one of the nomade Bedouin tribes. It was surrounded by a low circular thorn fence, immediately inside which was a ring of hemispherical huts, the framework of bent sticks, covered by mats. These huts can be taken to pieces, and packed on a camel or a bullock, and set up afresh in a very short time. We found them generally used, not only throughout the nomade Mahommedan tribes of the Habab, but also amongst the agricultural Christian population of the Anseba valley and Bogos. Even when thatched huts are used, as at Keren, the hemispherical mat dome is placed inside.

In the centre of the circle were two or three isolated huts, said to be used, one for marriages, and another for the sick. I doubt if these be really their use. The inhabitants were much like Shohos, but a finer race. The men had enormous masses of frizzled hair, in which were stuck the usual two or three long skewers of wood or horn. Like all the people in Northern Abyssinia, they wore large straight swords, of German manufacture, instead of the little sickle-like weapons of the Shohos, or the longer curved scimitars of the Tigréans and other Abyssinians.

Uncouth as they appeared, these people were very civil, and their chief went on with us for some distance to point out the road. As we came out upon the open desert we saw many large gazelles (*G. Sœmmeringii*) in the moonlight; but they would not allow us to approach sufficiently close to shoot.

We reached Ain in the morning. A small stream, fed by a spring, runs between thick green bushes and reeds in the bed of the Lebka torrent. Here we halted for a day. The slope of the coast plain must be considerable, since at Ain, about fifteen miles from the sea, the elevation by aneroid is about 1,200 feet. All the hills around are schistose and gneissic rocks, as are indeed all between Ailat and Ain. The general strike is still north and south. The dip at Ain is low, 20° or 30° to the west.

There were not many birds here which we had not obtained at Ailat, *Tockus nasutus* and *Crateropus leucocephalus* being the only important additions; but we were told that a herd of oryx (*O. Beisa*) inhabited the plain to the eastwards. Of all the antelopes of Africa none is, perhaps, so remarkable as the oryx, and I longed to see one. But, although we found fresh tracks, we could not meet with the animals themselves.

On the 7th we marched up the Lebka valley to Mohabar, a distance of about twenty miles. The ascent is very gradual, and the valley does not contract as in the Komayli pass. As a rule the road is very easy along the broad sandy bed of the Lebka, which early in July was quite dry, the rains in the higher part of the valley having scarcely commenced. In one or two places the ravine becomes narrower, with steep sides; one of these places is known as Aualid Oret ("the Daughters of Hades"), but its appearance is less formidable than its name. The bed of the stream is rocky, but our loaded camels got over without much difficulty.

We encamped in the bed of the stream. The next morning we found that a large lion had walked past our camp and down the stream during the night. We took up his tracks, but unsuccessfully. The day before a lion, probably the same, had killed a cow and then a man close to Mohabar.

The sandy ravine bed was fringed here with fine tamarisk trees, which abounded in hawks and falcons.

The little *Nisus sphenurus* was especially abundant, feeding on *cicadæ*. It is a smaller bird than the closely allied shikra of India (*Nisus badius*), and more insectivorous.

At night it was cloudy, a little rain fell, and we moved our tents and baggage hurriedly, for there was lightning and thunder to the westward at no great distance, and our people feared that the stream might come down suddenly. We saw some of the sudden floods so prevalent in these torrent beds afterwards, and certainly they are to be feared. However, on this occasion the water did not reach us.

Another long march up the valley produced a great change. As far as Kelamet, twelve miles from Mohabar, we were still amongst parched and barren hills, but at an elevation of about 3,500 feet we came almost suddenly into a tract of hilly country covered with the richest verdure. Green bushes and kolqual trees covered the hill-sides, magnificent baobab trees were dotted over the valleys, every little glade was covered with green grass. We had passed from the coast region, in which no rain falls during the summer months, into the highlands, in which the monsoon rains last from June till October, as in South-eastern Asia.

The temperature was delicious. Life seemed to return with new zest. A day or two sufficed to banish all the effects of the heat at Massowa and Ailat. The animals seemed refreshed like the plants, and birds were singing in all directions. Many of these were quite new to me; a parrot, *Pionus Meyeri*, was common, and no less than three kinds of rollers, *Coracias abyssinica, C. pilosa,* and *Eurystomus afer.* The first I had found in places on the highlands, the second I had once or twice seen only, the third I had never previously met with. Here all three were common.

At Kokai, where we pitched our tents, there was a small encampment of the Habab, and a very large herd of camels. Many cattle had been brought into the neighbourhood for pasture. The wild animals migrate from the lowlands at this season like the men, and we heard of wild elephants as soon as we arrived.

The next day, July 10th, some men brought us news of a herd in the neighbourhood, and on going out we saw an elephant, to our utter astonishment, standing amongst high bushes, with camels scattered around in all directions. Some other elephants, it was uncertain how many, were in higher jungle close by. The camels had been grazing in the neighbourhood all the morning, and the drivers had been shouting to each other and to their animals. Certainly the elephants cared wonderfully little for the presence of domestic animals, or even of men.

We lay still for some time and watched the huge beast, which stood about 200 yards away, lazily munching leaves, or flapping its large ears. There was no chance of approaching close, but by making a circuit we reached within about sixty yards without being seen, and Mockler fired a shell, which evidently hit, and the elephant dashed into the jungle in front, issuing again in front of us immediately after, followed by two other full-grown elephants and two young ones. As they crossed in front of us at about forty yards Jesse and Mockler both fired at the leading elephant, which fell over. The others stood by it, and were soon dropped also; but we had to fire several bullets before they were dead. Not a single attempt at a charge was made by any one of them. The smallest elephant was shot by accident.

A more unexciting attack it would be impossible to conceive, and I believe we all felt rather ashamed of ourselves for shooting such inoffensive animals as these elephants appeared. Abyssinian elephants are not always so harmless. An officer of the 2d Belooch regiment was severely injured, and very nearly killed by one which he had wounded near Suru. Lieut. Mockler was most viciously pursued by a herd which he attacked on the Anseba; and Mr. Jesse was charged by a large female without any provocation, on our return journey, close to this very place, Kokai. For my own part, this happened to be the first and last occasion on which I came across any elephants in Abyssinia. The only satisfaction was that we provided all the people in the neighbourhood with meat for some time. We made one or two essays ourselves. Trunk proved rather good, though tough; but elephant foot met with general disapproval.

On the 12th, Mockler went on. Jesse and I remained a day longer to collect at Kokai, and proceeded on the 13th. The road led through fine jungle for about five miles, gradually ascending. All the rocks, as throughout the Lebka valley, are metamorphic, but from Mohabar there is a considerable change in the foliation, which is here north-east and south-west.

After about two hours' gradual ascent, we came to a steeper path leading over a small range of hills between the upper portion of the Lebka valley and the basin of the Anseba. From the top of the little pass, which is called Mashalit, there is a fine view over the broad undulating valley in which the Anseba runs. We descended a finely-wooded valley, and found ourselves in an open country, with more signs of inhabitants than the Lebka valley, and cultivated in places. The population; however, owing to Abyssinian raids and internecine disputes and blood-feuds, is said to have much diminished of late years, and the area actually under cultivation is small compared with that which has evidently been cleared.

The most remarkable feature of the valley is the existence, on almost every conspicuous rise, of large circular piles of white stones. Nothing of the kind had been seen by us in the Abyssinian highlands. These piles of stones cover the graves of chiefs. In some cases the piles are not covered with the white fragments of quartz which are usually placed on the surface, and to which these sepulchral mounds owe their conspicuous appearance. Such graves, we were told, are those of men who have been murdered, and whose deaths have not been avenged.

The law of blood for blood, universal amongst Semitic peoples, prevails generally throughout Abyssinia. It is of this nature in the Anseba country. If a man is murdered or slain accidentally, it matters not how, his family may agree to receive blood-money from the slayer, the price being fixed usually at a certain number of cows, differing according to his status as chief or serf; but should the relations refuse to accept compensation, or, as is commonly the case, should the murderer and his family be unwilling or unable to pay, a blood-feud arises, and the relations of the dead man, up to the seventh degree, are bound to kill either the murderer or one of his near male relations, also to the seventh degree. As may be easily supposed, the feud either between families or tribes is seldom at an end with the loss of one or two lives: usually it continues until one or the other, by repeated losses, has become so weakened that it sues for peace, when an agreement is made, and sealed by intermarriage; a girl from each family or tribe being given in marriage to a man of the other.[1]

In many respects the people of the Anseba are a most interesting race, or group of races. Unlike the Habab and Samhar tribes inhabiting the country to the east and north-east, they are still for the most part nominally Christians. Forty years ago, all the Bedouins of Habab and Samhar were the same; but the Mahommedan religion in these lands has progressed, and is still progressing rapidly, and Mr. Munzinger pointed out to us several chiefs who had become converts to Islam. Both Christianity and Mahommedanism are of a most debased kind: there is neither church nor mosque, priest nor mulla; but the faith of the Mussulman is kept alive by wandering devotees, while the Christians have only the Frank missionary, who preaches to them a religion far more distinct from their own, in practice if not in creed, than that of the followers of the Prophet.

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[1] It was far from generally known in the army that poor Dufton's murder was in satisfaction of a blood-feud, and in revenge for the accidental death of a Shoho near Senafé. It is very much to be regretted that the murderers have hitherto been allowed to remain unpunished, if only because such impunity induces savages like the Shohos to believe that Englishmen care nothing for their own countrymen.

With the progress of Mahommedanism the rule of the Egyptians extends, and that of the Abyssinians diminishes. The former do but little for the country, except receive taxes; the latter do still less, always with the same important exception. Protection for life or property there is but little in Habab or Samhar, and none in Tigré.

At Kelamet we had passed the last Turkish outpost. The upper part of the Lebka valley and all the Anseba in this part of its course belongs to Tigré, and pays tribute to the chief of Hamazen. The tribe owning the part of the valley reached by us is that of Bejuk, and we rode to their principal village, Wasentel,—generally known, however, by the name of the tribe. We here found Mockler just returned from exploring the banks of the river, where he had found traces of rhinoceroses in abundance. This was good news. The Abyssinian rhinoceros had never been accurately determined, and there was some doubt as to whether it was not a distinct species from any occurring in Southern Africa. On our road we had met with three or four birds of which I had not specimens before, viz. *Nisus niger*, *Lamprotornis* *purpuroptera*, *Chrysococcyx cupreus*, and a ruticilline bird, which I subsequently found to be undescribed, my *R. fuscicaudata,* and in the evening I added to these *Palæornis torquata,* also an addition to my collection.

Having provided my men with as many birds as they could possibly skin, we all started together the next afternoon to look for rhinoceroses. We rode across the undulating plain, cultivated in patches, and intersected with ravines filled with thick bush, to the river, along the banks of which there is a narrow belt of high forest, with dense underwood of bushes. I had seen nothing so luxuriant in Africa. So dense is the underwood that it is only possible to creep through the tangled labyrinth of roots and branches by the paths made by the rhinoceroses which haunt these thickets. These animals retire into the thickest parts during the heat of the day. In particular spots, generally amongst high reeds, they select a small space of ground, which they clear of bushes, and these spots are well known to the natives as "rhinoceros houses."

In such a house, in the centre of a broader strip of thicket than usual, the men who were with us reported that two rhinoceroses, an old one and her cub, were lying. The approved method of endeavouring to shoot these animals is by walking silently into their retreats, firing at them, and then taking refuge up a tree. This, however, requires a degree of agility in tree-climbing upon which we could not rely, and it is not only dangerous, but, according to all the accounts we received, peculiarly unsuccessful, since we could never hear that a rhinoceros had been bagged by it. We accordingly posted ourselves at one end of the jungle, and told our men to shout and make noises at the other, but the rhinoceroses escaped across the river.

Immediately after this piece of ill-success, we discovered a herd of doe koodoo on the opposite bank. Riding across the stream, which was about knee-deep with a rather treacherous bottom, we proceeded to stalk the antelopes, again without success, a man having crossed the ground meantime and disturbed them. We, however, caught sight of them again, and Mockler shot a young doe. As we came up to the body two rhinoceroses, one a huge beast, the other about three parts grown, ran across the open about 150 yards from us, and disappeared in a broad ravine. After peering about for some time, a sharp-eyed Somali caught sight of the larger one standing in the jungle, and by making a circuit we came within 100 yards. Nearer approach was very difficult, and the bushes were so high that if we entered the broken ground, near the other side of which the animal stood, we should probably lose sight of her completely. Jesse and I took steady aim, and fired. With the most astonishing sound, a series of snorts like puffs from an enraged steam-engine, the brute, with its young one following, dashed into the bushes in front and came on towards us. The moment it left the spot where we had seen it, it vanished in the jungle, and only the snorting and crashing of the branches told of its rapid progress towards us, until it emerged just where we had been standing. Meantime we had modestly retired behind a neighbouring bush, the rhinoceros continued its route, and we followed, one of the Bejuk chiefs who was with us running ahead. Presently he rushed back, a perfect picture of excitement and delight, dancing like a madman, beating his shield with his spear, and springing nearly his own height into the air; telling us, partly by words, mainly by pantomime, that the rhinoceros was running round and round in a circle and falling over. We soon came up with it: the monster lay dying on the ground, the young one stood by prodding the mother with its horns, and evidently trying to induce her to move on. Though very badly hit, the old one took several more bullets before it was dead; the smaller animal, after receiving one or two shots, rushed off at the most astonishing pace, and we saw it no more. An examination of the body next day showed that Jesse's bullet, a conical, had hit on the shoulder, turned forwards, and lodged in the neck. Mine, a round bullet, had hit behind the shoulder, made a clean hole through the centre of a rib, and entered the lungs close to the heart. Its not having glanced on the rib showed the advantage of a hardened round bullet over a conical. I had fired with a heavy breach-loading No. 12, with a charge of five drachms of the strongest coarse powder.

After following up the smaller rhinoceros for a short distance unsuccessfully, it became dusk, and, strapping the koodoo on a baggage-mule of Mockler's, we started homewards. Scarcely had we done so when two lions began roaring in some bushes close by. We went up to the place, but it was too dusk to see anything. Scarcely had we crossed the river when another lion commenced, and we heard others on our way home. This was during our stay in the Anseba, a circumstance of nightly occurrence, yet in the daytime we could scarcely ever find the animals.

For two or three days Jesse and I were busily occupied in collecting and skinning. We drew lots for the spoils of the rhinoceros. Jesse won them, and with much labour preserved the skeleton, which is now in the British Museum, and has been determined to be that of the keitloa.

On the 16th Mr. Munzinger arrived, having ridden from Ailat in only three days. On the following morning Mockler and I rode with him to Keren, the principal village of the Bogos, about sixteen miles south-west of Wasentel. The road lies up the Anseba valley, the river being crossed about half-way. Although we had only had occasional showers, usually in the afternoon, heavy rain frequently fell near the source of the stream in Hamazen, and the water was constantly very muddy, and the river more or less flooded. After crossing some hilly ground, our route lay up the bed of the Dari, a tributary of the Anseba, now dry, and thence over undulating ground to Keren.

This was the largest village we had seen. A considerable proportion of the houses were the usual beehive-like mat huts, but there were also a number of much larger dwelling-places with walls of wattle, and thatched. The thatch, however, was not very good. A heavy thunder and hail storm came on soon after we arrived, which penetrated through it, and we were obliged to take refuge in an inner room covered with mats,—a larger specimen, in fact, of the usual Bedouin beehive.

Keren lies at the foot of a fine range called Zeban, consisting of highly granitoid rock. All the metamorphics around are more highly crystalline than usual, and the hills, as usual, in consequence of the peculiar mode of weathering, appear to consist of gigantic rounded blocks piled upon each other.

We returned next day to Bejuk. Wald Michele, the ruler of Hamazen, had threatened to march upon the Bogos and "eat up" the country, because Kassai, the Prince of Tigré, had appointed a M. René, a Frenchman in his service, to receive the revenue instead of Wald Michele. Mr. Munzinger wrote to Wald Michele, and induced him to put off his raid, and to refer the matter in dispute to Kassai, as the superior ruler. This was an admirable instance of the influence which Mr. Munzinger has acquired amongst these people; an influence which, it is scarcely necessary to say, was of the very greatest importance during the progress of the expedition, and to which indeed no small portion of its success was due.[1]

Although Wald Michele was perfectly friendly to us, we judged that in the event of disturbances it would be wiser to keep a little out of the way, and we consequently made two short marches down the Anseba valley, the first to Waliko, the second to a place called Hegyargillé, near Maregas. The country continued much the same.

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[1] I believe it is not too much to say that the march of the army upon Magdala would have been delayed by at least a month but for Mr. Munzinger's assistance. It will scarcely be credited that the only recompense made to that gentleman for his services has been the abolition of the consulate at Massowa, and his consequent dismissal from the British service, with a formal letter of thanks from the British Consul in Egypt.

The fauna of the valley is very rich and varied. It comprises many animals which appear to be restricted to what may be termed the sub-tropical zone, and which are neither met with on the coast nor in the highlands. I obtained a magnificent collection of skins, both of birds and mammals. The following will serve to give a general idea of the principal animals found.

Monkeys were not very common, and the baboon (*Cynocephalus hamadryas*) less than usual. *Cercopithecus griseo-viridis* was occasionally seen in the trees near the river. I saw no bats, and wild cats were rare. Leopards were less common than in the rocky valleys to the east. Lions abounded, as already remarked. Hyænas (*H. crocuta*) and jackals (*Canis mesomelas*) were the commonest carnivora.

Amongst the pachydermata, rhinoceroses have already been mentioned. The white African rhinoceros (*R. simus*) does not occur in Abyssinia or the Nile valley, so far as is known. Hyraces are not common. The wild hog (*Phacochœrus*) was occasionally met with, but it is less common than near the coast. The ruminants of the Anseba valley are all antelopes. The koodoo is found in the open valley, the klipspringer on the rocky hills around; while the little Beni Israel (*Neotragus saltiarius*) keeps to the bushes. Another bush antelope (perhaps *Cephalophus madoqua*) was also seen, but not shot.

Hares were scarce; those seen belonged, I think, to the large highland race (*L. tigrensis*). I had ill success with rats, and could catch none, though I constantly set traps for them. *Sciurus annulatus* was found in the river thickets, and *Xerus leuco-umbrinus* in the open ground.

Of raptorial birds, the most common were *Gyps Rüppelli*, the two common species of *Neophron*, *Nisus sphenurus*, *Aquila rapax*, *Milvus migrans*, and the great owl (*Bubo lacteus*). The magnificent *Helotarsus ecaudatus* was not uncommon, and I shot one specimen of *Falco barbarus.* Parrots were represented by *Pionus Meyeri* and *Palæornis torquata*, barbets by *Pogonorhynchus abyssinicus*, *Barbatula pusilla*, and *Trachyphonus margaritatus.* One woodpecker only was seen (*Picus nubicus*), but two species of indicator (*I. minor* and *I. Sparmanni*) were obtained. Cuckoos were more numerous, *Centropus superciliosus* being far from rare. I also shot *Oxylophus afer*, *O. jacobinus*, *Chrysococcyx cupreus*, and just before leaving, *Cuculus canorus*, which appeared in August. Both the plantain-eaters (*Turacus leucotis* and *Chizäerhis zonura*) occurred, and both colies (*C. leucotis* and *C. macrourus*). Neither *Caprimulgi* nor swifts were very common until the beginning of August, when the European swift (*Cypselus apus*) made its appearance. The three rollers abounded as at Kokai; of kingfishers *Ispidina picta* was not rare in the thickets; *Halcyon senegalensis* and *H. semicærulea* also occurred.

The only bee-eater found was *Merops erythropterus*; of hornbills, *Tockus nasutus* and *T. erythrorhynchus* were common. *T. Hemprichii* was only found on the hills around; *Bucorvus abyssinicus* was frequently seen. I shot two species of Irrisor (*I. erythrorhynchus* and *I. aterrimus*), and the common hoopoe.

The passerine birds were of course numerous: it will suffice to mention the principal. Swallows were represented by *Hirundo puella*, my new species *H. æthiopica*, *H. rustica*, and *Psalidoprogne pristoptera*; sunbirds by *Nectarinia affinis*, *N. pulchella*, and, on the hills around only, *N. cruentata*; flycatchers by *Tchitrea melanogastra* and *Platysteira pririt*; shrikes by *Lanius humeralis* (not common), *Laniarius æthiopicus*, *L. gambensis* in the river thickets alone, *L. erythropterus*, *Nilaus brubru* and *Dicrurus divaricatus*. Thrushes were rare: Mr. Jesse obtained *Turdus pelios*, and I saw *Cossypha semirufa*; *Turdus simensis* did not appear to occur at this elevation. Most *Saxicolinæ* were absent at this season. The sylvians were represented by the Abyssinian wren, *Oligocercus micrurus*, and *Camaroptera brevicaudata*; they also were not abundant, nor were *Drymœcæ*. Two species of *Crateropus*, *C. leucocephalus* and *C. leucopygius*, were common, and, as in other instances, exemplified the meeting at this elevation of birds which, like the former, range to the sea-coast, and, like the latter, to the highlands. Of the tits and their allies, *Parus leucopterus*, *Zosterops abyssinica*, and *Eremomela griseo-flava* occurred.

The only crow was *Corvus affinis*. The starling tribe was numerously represented: *Lamprotornis purpuroptera*, *Lamprocolius chrysogaster*, *L. chalybæus*, *Buphaga erythrorhyncha*, and *Textor alecto*, were all abundant. The weaver-birds were *Hyphantornis galbula* and *H. luteola*, both breeding, and *Quelea æthiopica.* The principal finches were *Vidua serena*, *Amadina cantans*, *Estrelda minima*, *E. phœnicotis*, *Pytelia citerior*, *Emberiza flaviventris*, and *Passer Swainsoni.* I observed no larks, but *Anthus sordidus* was common on the hill-sides.

Of pigeons and doves the following occurred: *Columba guinea*, *Turtur semitorquatus*, Rüpp., *T. senegalensis*, *Peristera afra*, and *Treron abyssinica.* Guinea-fowls and two species of partridge (*Francolinus Rüppelli* and *F. gutturalis*) were common; *F. Erkelii* inhabited the hills around the valley.

Waders were scarce. *Scopus umbretta* was found on the river banks, with a few sandpipers. The only plovers shot were *Œdicnemus affinis*, *Lobivanellus senegalensis*, both very scarce, and *Sarciophorus tectus.* The only swimming bird was the Egyptian goose, which in August began building nests on the trees near the river.

I obtained one land tortoise (*Cinixys Belliana*), and one river species (*Pelomedusa Gehafie*). Some scinques and lizards were seen, but none captured. I found a young chamæleon, apparently new, but allied to *C. lævigatus.* The only snakes procured were *Boödon lemniscatum* and *Psammophis sibilans.* Reptiles altogether were scarce, and no fish occurred in the stream, which is dry for eight months in the year.

A month passed rapidly. The weather was by no means unpropitious. Although this was the height of the rainy season, the nights and mornings were invariably fine. Rain usually commenced about two or three o'clock in the afternoon, and lasted for one or two hours, occasionally, but rarely, until sunset. More frequently only a shower fell. Mockler, who devoted his attention chiefly to rhinoceroses, was not very successful, but before leaving the valley we succeeded in shooting a second, rather smaller than the first. We had abundance of small game; guinea-fowl and partridges were always procurable when the larder was empty, and Mockler killed several koodoo; all does, however, until just as we were leaving the valley, when we shot a fine buck between us. One evening Jesse and I, who had returned to camp, received a message that Mockler was watching a lion close by. We went out, and found our friend sitting on a low hill. About 300 yards away, in an open piece of ground, lay an immense lion with a short mane, as usual in Abyssinia. Our attempt to shoot him was, however, unsuccessful; for, on approaching, he slunk off.

Our supplies gradually ran out, and the only corn procurable at Keren was millet; even that was very scarce. On the 8th August we quitted the banks of the Anseba with much regret, and crossed the Mashalit ridge once more. Mr. Munzinger, who had only been able to remain with us part of the time we were in the camp, had rejoined us, and also a Mr. Schmidt, who was returning from Keren. Whilst halting at Kokai on the 9th, a heavy shower fell, and the ravine beside us was suddenly filled with a torrent three or four feet deep. In an hour this had run down again.

On the 10th August we marched to Kelamet. This had become much greener than before, but still the change was great. On the 11th, in a most violent squall of wind and rain, several of our tents were blown down, including my bell tent of course. A bell tent always is the first tent to be blown down. Luckily I had secured my collections in boxes, and only lost a few butterflies.

In consequence of these frequent showers, floods in the Lebka had become of daily occurrence, and the gorge of Aualid Oret was impracticable and dangerous. Instead, therefore, of returning by the river-bed as we had ascended, it was necessary to make a detour to the northward, and to go round by Rairo near Af Abed. After the thorough wetting of the day before, I was occupied all the morning in drying my tent, &c. It was consequently afternoon before I started with Jesse, all our companions having gone on earlier. Leaving the Lebka valley, our route lay across very open country, over wide plains covered with thin bush jungle, and scattered hills. The rocks became excessively granitoid, and scattered tors of the usual detached rounded masses were frequent. We had accomplished the greater portion of the march, which did not exceed about fifteen miles, when a heavy shower induced us to take shelter under some rocks beside a dry stream-bed, which we had just crossed. Presently there was a rush of water, and the stream-bed was filled with a torrent about four feet deep, and almost, if not quite, impassable from its violence. The rain soon ceased, and we started again, congratulating ourselves on having been on the right side of the stream. However, we had only progressed about a quarter of a mile, and the roaring of the waters behind us was still audible, when we became aware of the unpleasant circumstance that there was another stream in front; and, on reaching it, our disgust may be conceived at finding that it was broader and deeper than the last, and that crossing it was out of the question. We were in the position of Horace's rustic, and had to wait till the river ran down; however, rivers in Abyssinia do run down in time. But there was no change until nightfall, and as soon as it was dark our guide professed ignorance of the road, except in daylight. There was no help but to bivouac. We found a small cave, the bottom of which consisted of soft sand; a fire was soon procured by the help of our guns, and a brace of guinea-fowl, which we had fortunately shot on the road, cut in pieces and grilled on a stick, supplied us with supper. The night, as usual, was fine, and next morning the stream had greatly subsided, though water was still running in it. We soon reached our destination, and learned that Munzinger and Mockler had also lost their way, and had passed the night at Af Abed, in no greater comfort than ourselves.

At Rairo we found a very large encampment of Bedouins belonging to the Habab tribes, with sheep, oxen, and goats. They had brought their flocks from farther north, where no rain had fallen, and where pasture was consequently deficient. Lions had followed the flocks, as usual, and there was great roaring at night, one very noisy fellow coming close to our camp, and causing great commotion. He killed a cow, and in the morning the villagers discovered his lair, and told us of it. We went out, but meantime he had retreated, and taken up his abode on one of the granite hills, behind a huge boulder. We waited at the base of the hill, and the Bedouins climbed over the top from the other side to drive him down, but he escaped along the slope. He was a splendid lion, with the usual short mane. Either the same or another returned to the camp as soon as it was dark, and treated us to the usual serenade.

The country around Rairo is unusually granitoid, and the hills barren and tor-like. On the 15th August we marched back into the Lebka valley, encamping at a place called Wonber Harattib, a little below Aualid Oret. I shot several birds on the road (*Gymnoris canicapillus*, *Emberiza flaviventris*, &c.), and was helping to skin some of them, when a camel-man rushed in to say that some lions had come down, and one of them had seized a camel. We were all very soon upon the spot, not a quarter of a mile from our camp. It wanted quite half an hour to sunset. On a low rise in front lay a fine lion, a little below him was a second, whilst amongst the bushes, only sixty yards from us, was a huge tawny mass, quite undistinguishable at first, until a slight movement of one portion served to guide the eye. The camel lay on its side, and a lioness had seized it by the throat, and was holding it down. The slight movement which had enabled us to distinguish the two animals, which were exactly of the same colour, was due to the lioness tearing at the camel's throat. Mockler fired, and hit the lioness; I was aiming at the moment, and as the brute moved off without a sound, my bullet went harmlessly under her belly. Jesse had not distinguished the parts in the confused mass of tawny fur, and, aiming carefully at the lioness, as he thought, found subsequently that his mark, which he hit, was the unfortunate camel's thigh. The lioness ran up the side of the hill, under a very heavy fusillade, and fell over dead. The camel had several tooth-marks in the throat, but no large blood-vessel was injured, and, despite lion and bullet, she lived to reach Massowa some days afterwards. The other lions ran off; we followed, and fired several shots, but they had a long start, and we could not hit them. They did not fail to return in the evening, and amuse themselves by roaring close to our camp as usual.

This was a good instance of the insolence which lions show. They are certainly bolder animals than tigers, but all the wild animals in Abyssinia appeared to me to fear man less than they do in India. The only exception is amongst the antelopes, which are at least as timid in Africa as in Hindostan.

On the following day we marched down the Lebka to Ain. The floods which had descended had changed the little watercourse greatly, but away from its banks all was parched and arid. There were far fewer birds; many appeared to have migrated to greener regions.

On the 17th August we started in the afternoon for the long march from Ain across the desert of Shob. Instead of keeping near the hills we took the direct road to Massowa, which runs further to the eastward. It was an intensely hot night, and we had a most dreary march, and became one and all intensely thirsty. About two in the morning, to our surprise, we heard the rush of water, and found that a flood had come down one of the streams from the hills called Mai Aualid, and filled the watercourse with liquid mud rather than water; however, thick as it was, it tasted delicious after our long hot march. In the morning Mockler went on, Jesse and I waited, intending to ride forward in the afternoon; but about one o'clock a sudden puff of wind carried away my bell tent, and we started, and rode about six miles further to the Amba, another watercourse with a few pools of water in the bed, near to which stood Mockler's tent.

This is a well-known resort for oryx, and Mockler had seen a herd in the morning. Jesse and I resolved to halt there for two or three days, whilst Mockler went on to Massowa, where we expected a steamer would touch about this time, in which we could all have returned to Aden. The next morning accordingly both of us went out early in separate directions. I went several miles, and saw one or two Sœmmering's and Dorcas gazelles, but no oryx, although their tracks were common. I had nearly returned to camp, when, ascending from a small ravine, I at last saw on the plain in front the animal I had longed to catch sight of ever since I had been in Abyssinia. Even at the distance of half a mile, the cream-coloured hide and black marks on the legs and face were sufficient to show what the antelope was. I lay down and watched her (it proved to be a female) through a glass. The long, straight, tapering horns, the beautifully-formed limbs, the almost bovine tail, and the singular symmetry of the Beisa, as this oryx is called, combine with the unusual colour to render it one of the most striking and elegant even of antelopes.

The oryx moved off with a quick, steady walk : she had seen me, and turned from time to time to look. Leaving my horse and men for her to watch, I stole up a ravine, and at its head lay behind some rocks till she had crossed a low rise, when I pushed on to the top, and had the satisfaction of seeing her walking slowly only 150 yards away. I fired and hit her, missing with my second barrel, however, but her leg was broken, and following up I hit her again. A long chase ensued ; I was excited and unsteady from running, and missed several times, till at last I had but one bullet left, and as wounded oryx have the reputation of charging, I slipped a shot cartridge into the second barrel of my rifle. However, a Bedouin cut her off as she was very nearly done, turning her towards me, and I had the satisfaction of rolling her over. I was surprised to find it was a female : from the splendid horns, twenty-nine inches long, I had certainly supposed it to be a buck, but the females of the Beisa oryx have horns as long as those of the males, or longer.

I secured and preserved the skin. Specimens of this kind of oryx (*O. Beisa*) are extremely scarce in museums, far more so than those of the Cape oryx (*O. capensis*), or of the North African (*O. leucoryx*). On the following afternoon I had a great piece of good fortune. I saw two of these fine antelopes, and made a successful stalk, getting close to them, when they perceived me, and ran out. I dropped one, and the other turning round I shot it also, thus killing two right and left. On the third day I killed a fourth. Jesse, who had worked harder than I had, and had gone over more ground, singularly enough did not see a single oryx.

There were a few birds at Amba which I had not previously met with, amongst others *Sylvia cinerea.* To my surprise I saw the Abyssinian roller also in this hot region.

A party of Egyptian officers remained two days at Amba whilst we were there. They were engaged in laying out the line for an electric telegraph to unite Massowa and Kussala. Two of them spoke French, and one of them knew a little English.

A few of the migratory birds were beginning to return from the north. I shot a grey harrier (*Circus cineraceus*) on August 19th, and *Lanius isabellinus* on the 22d. No *Saxicolæ* appeared, however, except *Cercomela melanura,* which is a resident.

We returned to Massowa on the 23d August. No steamer had arrived from Aden, and on the 27th, the Egyptian steamer coming in, Jesse left by her for Suez and England. Mockler had not been able to obtain a boat for Aden, nor could we secure one till the 29th, when we shipped ourselves and our men, and started.

The boat we had secured was an open Arab dhow of small size. There was a quarter-deck, just large enough to lie upon, and a small den below, in which some of our people usually ensconced themselves. The only covering during the day was a sail, but even with this poor protection the change from the intense heat of Massowa was refreshing.

Of course, for any boat to start on a cruise properly provided is one of those accidents which does not happen in the East; we had scarcely congratulated ourselves on having succeeded in only losing six days, when we found that our craft had not sufficient supply of water on board, and that it would be necessary to run across to Dissee island, in order to take some in. This was not the less provoking that the wind was fair to run out past Dahalac. However, there was no help: to Dissee we went, and remained there till next day at noon. I atoned for the delay by shooting a fine pair of pelicans (*P. rufescens*) in full plumage, with richly roseate backs, and picking up a number of interesting shells and corals on the shore.

At last, on the 30th August, we started fairly for Aden. Our speed was not great, for, if there was sufficient wind to carry our boat along at more than about six knots, our crew immediately shortened sail, for fear of carrying away the mast, which was badly strained. We had some little difficulty in inducing our men to go on at night, and not lie to altogether, but Mockler persuaded them, by the promise of additional payment, to compromise the matter by only shortening sail. Luckily the wind was fair and light; if our progress was not fast, it was steady, and we ran down to the Straits of Babelmandel in two days and a half, passing Perim Island on the 1st September. Thence to Aden our progress was slower, the wind was unfavourable, and we only arrived in the harbour on the morning of the 4th. On landing we were most kindly received by General Russell, the Resident. I was delayed for a week waiting for a steamer to Bombay, which I finally reached on the 18th September, after an absence of nine months and a half, eight of which had been spent in Africa.

Altogether, I have never spent eight months more pleasantly. The country was most interesting, the climate during the greater part of the time perfect, and the fauna and geology had all the attractions of novelty. The time was quite insufficient for a thorough examination of the country traversed, but still I had reason to congratulate myself at having been able to accomplish what I had. The scientific results of my journey may be thus briefly summed up. I had, I believe, succeeded in determining the true succession of the principal rock systems of Abyssinia, and of defining their characters with much greater exactness than had previously been done, besides confirming, upon a considerable amount of additional fossil evidence, the opinions of Messrs. Ferret and Galinier as to the age of the only series which has yielded organic remains. I had collected about 1,700 specimens of Vertebrata, representing 350 species, besides a considerable number, about 3,500 specimens, of Mollusca and Articulata, representing about 500 species. I can only add in conclusion, that this amount of success was due to the hearty assistance which I received from the officers of the army; all, almost without exception, appeared to take a genuine interest in scientific research, and a desire to aid me in carrying out the objects of my mission to Abyssinia. While it is very much to be regretted that a wider exploration could not be carried out, and that no additional knowledge was obtained of those parts of the country to the southwards which are but little known, or quite unknown, to Europeans, it is a satisfaction that the campaign was not allowed, like so many others, to be entirely useless to science, and that at least an endeavour was made to profit by the opportunity afforded of examining under peculiarly favourable conditions a most interesting region of the earth's surface.

PART II.

GEOLOGY.

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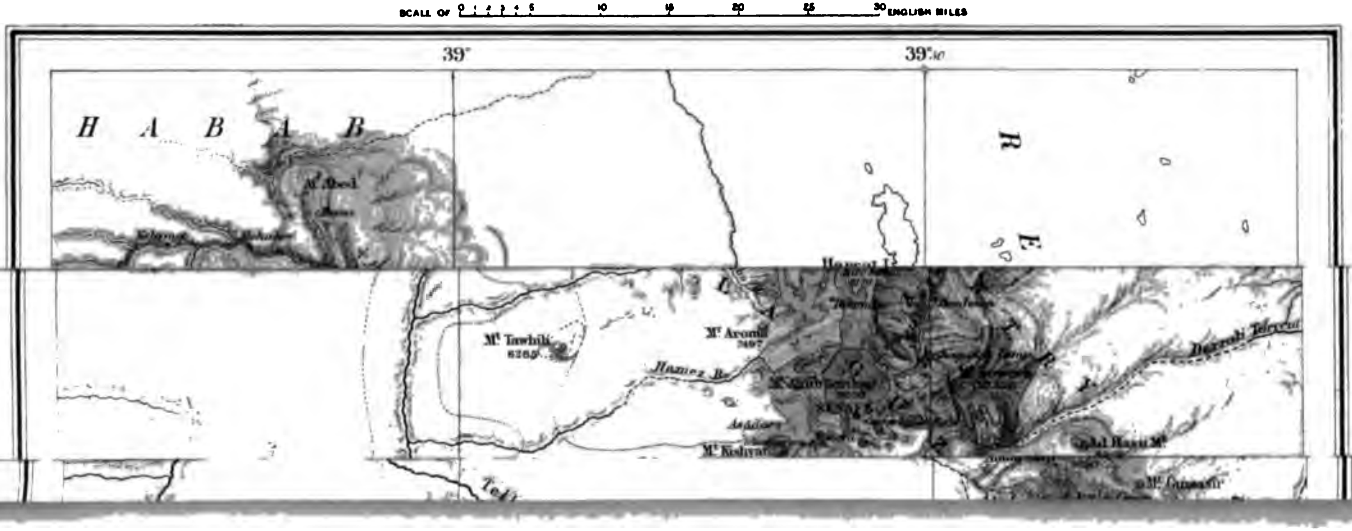
GEOLOGICAL MAP
OF THE PORTION OF
ABYSSINIA
Traversed by the British Expedition in 1868 from Annesley Bay to Magdala
and of the country between Massowa & the Anseba Valley.

BY W. T. BLANFORD.



GEOLOGY.

INTRODUCTION.

WHILE a considerable number of details relating to the geology of the country traversed have been mentioned in the preceding part, it is intended in the following pages to give a general description of the various rock systems observed. These appear to embrace the only great formation hitherto recorded by travellers as occurring in Abyssinia, with the possible exception of the coal-beds said to be found in Chelga, north-west of Lake Dembea, of which, however, no account hitherto published appears to afford any geological information, and which may possibly prove to be part of the same system as the Adigrat sandstone.

Before passing to these descriptions, a few words on the labours of previous observers are necessary. The geology of Abyssinia has met with far less attention than its zoology, and, with the exception of Messrs. Ferret and Galinier, no travellers have left any very extensive record of their observations. Scattered remarks on the rocks are distributed through many works, from those of Bruce and Salt to the recent narratives of Markham and Von Heuglin; but the only important contributions to the geology of the country with which I have been able to meet are the following:—

In 1834 Rüppell published a "Sketch of the Geological Formations of Abyssinia" ("Skizze der geologischen Formation-Abyssiniens"), in the *Museum Senkenbergianum*, vol. i. p. 286. It is merely a sketch, as its name implies, but a good one nevertheless, and contains much information on the different rocks found on the shores of the Red Sea, and in Agamé, Adowa, Temben, Simen, and around the Lake Tzana or Dembea. All the Simen hills and the whole country around Lake Dembea consist of volcanic rocks. I must differ, however, from Dr. Rüppell on one point. He speaks of the massive hills of Senafé as of hardened marl (*Kalkmergel*). As already stated, they appeared to me to be of a kind of claystone passing into trachyte.

A letter from M. d'Abbadie, published in the *Bulletin de la Soc. Géologique* for 1839, vol. x. p. 121, gives, in very few words, an excellent description of the coast near Massowa (which he considers an alluvial formation daily increased by the effects of torrents), and of some geological phenomena observed on the route between Massowa and Gondar. The high temperature of the springs in Samhar is noticed, and, on the highlands, the remarkable masses of sandstone with perpendicular faces. In M. d'Abbadie's opinion, the form of the mountains of Tigré is not due to the effect of tropical rain.

A much longer "Rapport géologique et minéralogique sur la Province de Tigré," by M. Vignaud, published in the same *Bulletin* for 1843, vol. xiv. p. 492, consists mainly of an account of the country around Adowa. The volcanic rocks in the neighbourhood of the Red Sea are mentioned, and the destruction of ancient Adulis attributed to a "general movement" connected with them,—a view which appears to have found favour with several travellers, but for which I am unable to find any authority. Most of the volcanic rocks on the shores of the Red Sea are certainly far more ancient than Adulis, and the destruction of the town is more probably due to political than to volcanic causes. M. Vignaud's petrological nomenclature is so peculiar, that his account is not easily understood. He gives a minute description of the rocks met with between Adowa and the Mareb, and appears to regard all, including the volcanic formations, as of transition age. Unlike M. d'Abbadie, he considers that the violent rains, by removing the soluble portion of the rocks, such as alumina and lime, have hollowed out the ravines.

In the *Comptes Rendus* for 1841, vol. xii. p. 732, is an abstract of a memoir by M. Rocher d'Héricourt, on his first journey from Tajurra to Shoa. He especially refers to the presence of volcanic rocks, and of hot springs. A brief account of the second journey of the same writer appears in the *Comptes Rendus* for 1845, vol. xxi. p. 883. It contains nothing of geological importance; but in the *Bulletin de la Société Géologique de France* for 1846, p. 541, the same author gives a brief but still much more complete account of his geological observations made in Egypt, the Red Sea, the Gulf of Aden, the Adel country, and in Shoa. He describes the prevalence of volcanic rocks, and of recent cones in the southern portion of the Red Sea; also at Tajurra, and throughout the Adel country. He found the basement rocks of Shoa to consist of granite and other associated crystalline rocks, upon which rest cones (?) of trachyte and basalt, sometimes of great height and vast extent. He especially describes the hill above Angobar (or Ankobar), on the slope of which the town is built, as a crater of elevation, the mass formed of trachyte, while basalt covers the sides; Angolala, the second capital, is built on a *butte de soulèvement*, of which the principal element is basalt; whilst at Debrabrame, between the two, zirconiferous syenite is found. He also describes a great ravine, fourteen leagues north-west of Angolala, 1,254 metres deep, and only 800 broad. The sides are of volcanic tufa, resting on primitive rocks.

It is probable that the traps of Shoa are precisely similar to those to be presently described, as occurring near Antalo, Ashangi, Magdala, &c., and that the trachyte of Ankobar really is superior to the basalt, and rests upon it, the rocks being probably bedded, as they are further north.

Messrs. Ferret and Galinier, two staff-officers of the French army, were in 1839 entrusted with a commission from their Government to explore portions of Abyssinia, and they remained in that country nearly two years, from October 1840 till August 1842. A short notice of their geological observations appeared in the *Comptes Rendus* for 1844, vol. xix. p. 881; but a much more extended account was given in the third volume of their "Voyage en Abyssinie," published in 1847. The first seventy-six pages of this volume, which is filled with the scientific results of the journey, are devoted to the geology. Numerous remarks on the same subject are scattered throughout the first two volumes, containing the narrative of the personal adventures of the two travellers; and the accompanying atlas comprises a geological map of Tigré and Simen, and several geological sections.

The work of Messrs. Ferret and Galinier is by far the most important contribution to the geology of Abyssinia which has hitherto appeared, and the greatest credit is due to those gentlemen, not only for the great energy and research displayed by them, but also for the admirably clear description of the observations which they have furnished. That they had but little previous experience of field geology is probable, and I am obliged to differ from some of the conclusions at which they have arrived; but the value of their observations is in no way impaired.

Messrs. Ferret and Galinier divide the rocks observed by them into the following systems:—

"1. Terrains primaires . .	T. gneissique . . .	granite gneiss micaschiste protogine talcschiste

2. Terrains intermédiaires	T. inférieur ou phylladique	talcschiste phyllade syénite
3. Terrains secondaires .	T. carbonique	diorite amphibolite, &c.
	T. oolitique	
4. Terrains tertiaires . .	T. sédimentaires	grès, &c.
	Roches d'origine ignée qui appartiennent aux terrains tertiaires	trachytes basaltes
5. Terrains modernes."		

The oolitic rocks of this table are the limestones near Chelikot and Antalo, and the sedimentary tertiary beds the sandstones of Tigré described below as the Adigrat sandstones, to which I assign a much earlier geological age—but they are not fossiliferous.

Messrs. Ferret and Galinier also consider that there is evidence of the existence of rocks of carboniferous, triassic, and cretaceous age in Abyssinia; the existence of the first being proved by the presence of coal, and that of triassic rocks by the occurrence of rock-salt and sulphur in the country between the highlands and the Red Sea. The indications of beds of cretaceous age are considered as very vague; but the travellers are inclined to attribute certain rocks in Shoa, described by M. Rocher d'Héricourt, to this series. The evidence in these three cases would not be deemed sufficient in the present day to prove the presence of the formations supposed to occur.

I have classed together the whole of the crystalline and sub-crystalline rocks, attributed by Messrs. Ferret and Galinier to primary, intermediate, and carboniferous, under one series, the metamorphic; not because I think it at all improbable that they may be divided, but because I have not myself seen any proofs of distinction. The oolitic beds of Messrs. Ferret and Galinier are my Antalo limestones, and I have entirely confirmed the opinions of those explorers. Their tertiary sedimentary rocks, as already mentioned, I consider pre-jurassic, and the tertiary igneous rocks of their classification appear to me, in part at least, probably of somewhat older date; but their epoch is uncertain.

I do not think it necessary to do more than refer to the works of Lefebvre,[1] or to Dr. Beke's valuable papers in the Royal Geographical Society's *Journal*,[2] because, although numerous geological notices occur in them, they add but little to what was previously known of Abyssinian geology. The same remark applies to the works of other travellers in an even greater degree.

Quite recently, in the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1869, p. 347, a paper has appeared, entitled "Geological Sketch of the Neighbourhood of Axum and Adowa, in Tigré," by Dr. A. Sadebeck. It consists principally of notes on a collection of rock specimens, sent by Dr. W. Schimper to accompany a map and sections. The rock specimens comprised granite of two forms, various crystalline rocks, claystone, claystone-breccia and conglomerate, and sandstone. The claystones are doubtless a variety of the trachytic rocks; but it is curious that, even when studied in the cabinet, the author of the paper has evidently been in great doubt as to whether they were of sedimentary or volcanic origin, and has preferred the former opinion. Having merely rock specimens, Dr. Sadebeck has classed together, under the general head of eruptive rocks, granites, porphyries, and basalts—a view not in agreement with the observations made a little further to the east; for it is evident that all the granites observed belong to a far more ancient series of rock formations than the basalts.

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[1] Voyage en Abyssinie exécuté pendant les Années 1839–43. Paris, 1845.

[2] Vol. x. p. 583; xii. p. 84; xiii. 254; xiv. p. 1. As mentioned subsequently, Dr. Beke has most obligingly allowed me to examine an interesting series of rock specimens collected during his travels.

SECTION I.

PHYSICAL GEOGRAPHY OF ABYSSINIA, AND ITS RELATIONS TO THE GEOLOGY, WITH REMARKS ON DENUDATION AND ON LAKE ASHANGI.

THE physical geography of Northern Abyssinia is well known, and there are few parts of the world neither inhabited nor frequently visited by Europeans of which so much had been ascertained previous to the expedition. Beyond a few corrections of latitudes and longitudes very little has been added except in matters of detail.

Abyssinia Proper consists of a mass of mountainous country, intervening between the basin of the Nile and the east coast of Africa. It rises on the east rather abruptly from the low country bordering the Red Sea and the Indian Ocean, and slopes away more gradually to the westward, the Nile tributaries cutting out deep valleys. The average height of the dividing range between the streams flowing to the east and to the west is about 8,000 feet, rising to 10,000 or 11,000 to the south and sinking to the north. Some peaks in Simen are said to reach 15,000 feet, and many in various parts of the country are 12,000 and 13,000, while to the southward many plateaux of considerable extent are more than 10,000 feet above the sea.

The plateau contracts greatly towards the north. The last of the great affluents of the Nile in this direction is the Mareb, which rises in Hamazen, almost due west of Massowa. The streams running from the northern side of Hamazen, the principal of which are the Anseba and the Barka, unite and flow into the Red Sea south of Suakim. Although a few isolated plateaux of 7,000 to 8,000 feet, such as those of Mensa and Marea, exist in the area drained by these rivers, the elevated country is of small extent, and the greater portion of the surface does not rise above 4,000 to 5,000 feet above the sea.

The fundamental rocks of all Tigré, and probably of all Abyssinia, are metamorphic. They compose the mass of the table-land, and while they occupy no inconsiderable proportion of its surface, they are exposed, in Tigré at least, in every deep valley.

'As a general rule, it may be asserted that, in the neighbourhood of the route followed by the British army, so much of the country as exceeds a height of about 8,000 feet above the sea consists of bedded traps. There are a few exceptions, such as the sandstone range of Sowera, near Senafé, but they are neither numerous nor important. The traps of Ashangi also descend to a much lower level than 8,000 feet above the sea. The greater portion of Central and Southern Abyssinia, as far south as Shoa at least, is known to consist of the same rock.[1]

Between the traps and the metamorphics a series of sandstones and limestones intervenes, one group of the former underlying the latter. The limestone alone is fossiliferous, and is of jurassic age.

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[1] It is shown by M. Rocher d'Héricourt to be the case in Shoa.

The country below the mountains along the Red Sea, inhabited by the Danakil, Somali, and Galla tribes, is but little known, and no opportunity was afforded to me of penetrating into it during the progress of the expedition, the only exploration made, that of Colonels Phayre and Merewether, in the direction of the Alelbad Salt Lake, having been accomplished before my arrival at Zulla. The region appears to consist of transverse (E. and W.) chains of hills, separating desert tracts, many of which are below the sea-level, and some of which may formerly have been parts of the sea subsequently cut off and dried up. Water is scarce, the rainfall being scanty, and all brought down from the hills by streams appears to be evaporated. Along the coast of the Red Sea there is a belt of volcanic rocks of very late geological age, the elevation of which may have cut off such tracts as the salt plain west of the Amphila and Lake Assal west of Tajurra, both of which are below the sea-level.

This belt of volcanic rocks is extremely narrow in the neighbourhood of Zulla and Massowa. A few observations of interest were, however, made upon it, which will be found hereafter. Before concluding this brief sketch, there are two points connected with the physical geography of Abyssinia of which some notice should be taken. These are the evidence of denudation afforded by its surface and the conditions under which the only lake examined occurs. Both are subjects of considerable interest.

The surface of the Abyssinian plateau, as has already been stated, has been deeply scored by the valleys in which the rivers flow. Many of those in Northern Abyssinia are remarkable enough: the Takkazzyé and Mareb flow in ravines at least 3,000 feet in depth. But it is in the area of bedded traps that these river valleys assume their most peculiar characters. The gorges of the Jitta and Bashilo, close to Magdala, impressed every one who saw them by their great depth and the excessive steepness of their sides, the breadth being singularly small in comparison. Similar deep gorges are known to be found further south.[1]

No such gorges can possibly result from marine denudation. The fiords of Norway, which are far broader in proportion to their depth, are glacier valleys, and certainly not due to the action of the sea. There is not the slightest evidence of any physical disturbance which could have produced such rents in the earth's surface; the strata which cap the scarps at each side of the ravines are perfectly horizontal. There has as certainly been no faulting, at all events in the case of the Jitta; bed corresponds to bed on the opposite sides of the gorge in the most perfect manner. There cannot be a question but that these enormous hollows are simply channels cut by the streams which run in them. The lapse of time necessary to have produced such an effect must have been very great.

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[1] One is described by M. Rocher d'Héricourt as traversing part of Shoa, at a distance of fourteen leagues north-west of Angolala, one of the principal towns. This ravine is said to be 1,254 metres (about 4,000 feet) in depth, and only 700 to 800 metres (2,500 feet) in breadth! It is to be presumed that the measurements were taken at a spot where the width was exceptionally small.

If the action of such small streams as the Jitta and Bashilo has sufficed to sweep away the contents of ravines 3,000 or 4,000 feet in depth, what may not have been the effect of rivers like the Takkazzyé and Mareb? How much of the Abyssinian highlands has been removed by these great torrents, and spread as an alluvial deposit over the basin of the Nile?

There is every probability that the trap hills of Adigrat, described in a subsequent page, are a mere outlier of the great mass of bedded trachytes and dolerites of Lasta, Amhara, and Shoa. It appears probable, from the accounts given by travellers, that the high ranges of Samyen or Simen, south-east of Takkazzyé, are another similar outlier. If this be so, then over a portion, probably over the whole, of Northern Abyssinia, there existed at least 4,000 feet of bedded traps, of which now only a few vestiges remain.

It is worthy of repetition that throughout this great denuded area, so far as it was possible to examine it, there is not a trace of marine denudation. The prevailing features of the country are deep ravines cut by rivers, and terraced hill-sides, moulded by the sub-aërial disintegration of the rocks of which they are composed. On all the slopes there are unequivocal marks of the unequal action of surface weathering upon rocks of different chemical constitution. This is especially seen upon the traps.

How far the great scarp of the Abyssinian plateau towards the Red Sea is due to marine action is a very difficult question. If the sea ever exerted any great influence on the denudation of the plains at the base of the range, it must have been at a comparatively remote period; for so far as they were examined, the hills presented a very different aspect from that of a sea cliff. Still it is highly probable that, before the commencement of the volcanic outbursts which have left their traces along the whole southern portion of its shores, the sea extended farther west, and very probably it reached the foot of the hills in places. But tropical seas, and especially calm land-locked basins, like the Red Sea, are trifling agents of denudation when compared with such oceans as the Atlantic. Independently of the local causes which determine the size of the breakers, most tropical coasts are more or less protected either by coral reefs, where no sediment is brought down by rivers, or by the deposition of that sediment itself, which, owing to the more *violent* rainfall (a far more important item than the absolute amount, although the latter is also usually excessive in the tropics), and to the more rapid disintegration of rock, is far larger in quantity than in temperate regions.[1]

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[1] I believe that the comparative importance of fresh-water and marine denudation is to this day misunderstood by many of the best geologists of Western Europe, and is only beginning to be appreciated by any of them, in consequence of the exceptional conditions there occurring. The whole of the circumstances attending the rainfall in tropical countries are far more favourable to denudation than in the temperate zone. Compare more especially the case of the British islands and the neighbouring portions of the Continent—the part of the world, that is, in which by far the greatest number of careful and continuous observations upon such phenomena as denudation have

Of the lakes of Abyssinia, only one was reached by the expedition; and this, Lake Ashangi, unfortunately

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been made—with that of any well-known tract in the tropics, such as British India. I select this for comparison, because I am best acquainted with the facts, and do not need to take them at second-hand. In the British islands the average rainfall is about twenty-four inches distributed over the greater portion of the year. In India it averages over the whole country about fifty inches, by far the greater portion of which falls in three months. The showers are far heavier, and far more effective in sweeping soil, sand, and pebbles from the surface of the country into the streams; and floods in the latter are of annual occurrence, instead of only happening at rare intervals. The effect of a river in full flood in sweeping detritus down into the sea compared with the usual denudating action, is as the comparison of the effect produced by the breakers of the ocean in a storm to those of an inland sea on an ordinarily fair day. In flood, a river is liquid mud rather than water. But, in addition to the great floods, minor floods in tropical streams are matters frequently of daily occurrence during the rainy season. That precisely the same phenomena occur in Abyssinia as in India I had ample opportunities of seeing in July and August; indeed, they are notoriously the rule in all tropical countries, except the few rainless regions.

But this is only one element in the comparison. It must be borne in mind that fresh-water denudation is distinctly antagonistic to marine; and where the former is large, the quantity of detritus carried down to the sea by rivers actually protects the rocks of the coast from destruction. The coasts of Abyssinia are so little exposed and so much defended by coral islands that they could not under any circumstances afford a fair opportunity for judging, even if the drainage of the country were not in the other direction. The coasts of the peninsula of Hindustan, however, are an excellent case in point. Along the whole eastern side of the peninsula, from the head of the Bay of Bengal to far south of Tanjore, at all events, the whole coast is fringed by alluvial deposits, except in one spot, close to Vizagapatam, where alone the sea washes away rock. Nearly all the great rivers of the peninsula pour their detritus into the sea on the east coast; but even on the west coast, where fewer and smaller streams, for the most part, enter the sea, there is throughout a very large extent of shore a similar alluvial belt. Further north, in Guzerat, Kattiawar, Cutch, and Sinde, the coast is in most places formed of alluvial deposits derived from the large rivers Indus, Nerbudda, Taptee, Mhyr, &c.; and throughout the whole immense shore line of British India, exclusive of the Burmese provinces, the only places where any marine denudation takes place are between Bulsar, south of Surat, and Mangalore, and at a few isolated points further south on the west coast, and at Vizagapatam on the is one of the smallest, although very interesting.[1] It is four miles long by three broad, and was found by Major Goodfellow and a party of engineer officers, who sounded it, to be 103 feet deep. As soundings were only carried on over a small portion of the lake, this may perhaps not be the maximum depth. The spot at which it occurred was not far from the south-west shore, and the bottom was found to rise in all directions around. Its chief peculiarity is the absence of any perceptible outlet whatever. To the west are high hills, to the east a lower range. The lowest portions of the rim surrounding the lake are to the north-east and to the south. The latter, evidently the lowest of all, are about 150 feet above the lake.

It appears almost certain that the lake has a sub-

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east. If over British India the effects of marine to those of fresh-water denudation in removing the rocks of the country be estimated at 1 to 100, I believe that the results of marine action will be greatly overstated.

Some years ago, before the question had assumed the present phase, before even Colonel Greenwood's pamphlet had appeared, I remember being struck by the absence of all signs of marine action and by the unmistakeable evidence of immense fresh-water denudation in the Himalayas of Sikkim, where ravines from 6,000 to 15,000 feet in depth are evidently the excavations of the rivers running in them: so I am no new convert to a belief in the complete efficacy of rain and rivers to produce gigantic effects. But after seeing, both in India and Abyssinia, what the effects of these agents are in tropical countries, I do not feel surprised that their powers should be recognised with difficulty in regions where their effects are comparatively so dwarfed as in the British isles, while the power of marine denudation is at its maximum from the enormous coast line exposed and the small amount of detritus furnished for its protection by rivers of small length, and in which floods are of exceptional occurrence.

[1] One of the principal geological questions which I had hoped to investigate in Abyssinia is the mode of origin of one of the large African lakes, such as Dembea. Unfortunately, I was unable to reach so far.

terranean outlet, for two reasons. The first is, that although the army was on its banks in April, at the close of the driest season in Abyssinia, there was no appearance of the lake having been at any period of the year more than a few feet higher than it then was. Situated as it is, almost at the edge of the steep descent to the eastward, with high hills to the west and north-west, the rainfall must be very heavy ; and it is difficult to conceive that in the months of July, August, and September it can be less than eighty inches, which is sufficient to increase the waters of the lake by thirty or forty feet.[1] So far as it was possible to judge, there was no evidence of the water having been more than a third of that amount above the lowest level. It is extremely improbable that the rainfall could be evaporated within the year from the surface of the lake.

The second reason is the perfect freshness of the water. This alone appears conclusive as to the existence of an outlet, for otherwise the water must gradually become charged with salts. A similar case occurs in Berar, in India, at the little lake of Lonar. This lake is a little smaller, but its drainage area is very much less than that of Ashangi, while the ground drained consists of precisely similar rocks. Lonar Lake, however, instead of being fresh, is at all times highly saline, and in the hot season it becomes a concentrated solution, depositing crystals of carbonate of soda. It also contains other salts in large quantities.

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[1] The rainfall in places similarly situated in India varies from about 100 to 200 inches. Taking the drainage area of the lake as a circle with a radius of 5 miles, or nearly 80 square miles, and estimating the area of the lake itself as 12 square miles, we have an increase in water for a rainfall of 80 inches of $\frac{80 \times 80}{12} = 533$ inches, or 44 feet 5 inches. Of this, if 10 feet, an excessive estimate at this elevation, and in so damp a climate, be allowed for evaporation, the amount of increase would still be more than 34 feet. I believe this estimate to be below the truth.

The outlet from Ashangi is doubtless to the eastward: the water, in all probability, percolates through the traps and re-emerges on the flanks of the deep valley inhabited by the Asubo Gallas.[1]

It is very difficult to account for the formation of such a hollow as that of Ashangi by any known process of denudation. It is scarcely credible that it can be an area of depression; the higher series of traps capping the hills around are remarkable for the absence of all evidence of disturbance: and it is difficult to conceive the formation of a small deep lake by gradual or rapid sinking without supposing this to be only one in a series of disturbances which would leave unmistakeable traces on the formations around. It is, however, certain, that the lower group of traps[2] near Ashangi is much disturbed, though not more so than it is in many other places, where the upper group is perfectly horizontal.

There is not the smallest trace of glacier action, and it may fairly be inferred that the denudation which would destroy all traces of glaciers would also fill up the lake with detritus. It is evident that the lake must be of very small geological antiquity, or it would have been filled up long since. At the same time basaltic rocks disintegrate as a rule much more rapidly on the surface than gneiss and granite, and would therefore retain traces of glacier action for a less time. But though, if the whole globe was at a much lower temperature during the glacial epoch, there appears no improbability in the existence of glaciers even in the tropics at a height of eight thousand feet above the sea,[1] still the ravines around Ashangi are so unlike glacier valleys that it is scarcely credible that the lake can owe its origin to the action of ice.

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[1] The valley immediately south of Ashangi, in which stood the camp of Masagita, appeared to me to be equally without an outlet. It was impossible to examine it, however, to the eastward, and other observers thought differently. But I cannot help thinking it possible that the accumulation of water in this hollow during the rainy season may have occasioned the representation on all the old maps of a small lake immediately south of Ashangi.

[2] For the distinction between these two, see *posteà*.

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[1] Their traces have been found by Mr. H. B. Medlicott in the Western Himalayas, far below this, only a few degrees further north.

SECTION II.

LIST OF GEOLOGICAL FORMATIONS.

THE various rocks observed in Abyssinia and described in the subsequent pages are the following. They are enumerated here in descending order, though, as is usual and most convenient in geological descriptions, they will be treated in the reverse sequence, commencing with the lowest. Local names have been given from the most important places at which the rocks of each group are well developed:—

6. Recent formations—Soils of the highlands, coral islands of the Red Sea, alluvial deposits near the coast.
5. Aden series of volcanic rocks bordering the Red Sea.
4. Trappean series:—
   A. Ashangi group.
   B. Magdala group.
3. Antalo limestones.
2. Adigrat sandstones.
1. Metamorphic rocks.

After passing the volcanic formations on the coast, the route lay over a simple ascending series of rocks as far as

Magdala, the different groups succeeding each other on the road precisely as given in the above list.

It should be repeated here that no rock systems of any importance besides those above enumerated appear to have been observed by previous travellers in Abyssinia, unless the coal-bearing formations of Chelga belong to a group distinct from the Adigrat sandstone.

SECTION III.

METAMORPHICS.

THE whole mass of the plateau of Northern Abyssinia, as far south as the neighbourhood of Antalo at least, consists of metamorphic rocks, capped only by sedimentary and volcanic formations.

As is usual in countries where altered formations are largely developed, the metamorphics of Abyssinia vary greatly in mineral character. The variation is, indeed, greater than usual, every intermediate grade being found between the most coarsely crystalline granite and a slaty rock so little altered that the lines of the original bedding are still apparent.

Perhaps the most prevalent form of rock is a rather finely crystalline gneiss. Hornblende-schist and mica-schist are met with, but neither of the minerals from which they are named appears to be so abundant as in some metamorphic tracts. On the other hand, a compact felspathic rock, approaching felsite in composition, is prevalent in places, as in the Suru defile, between Komayli and Senafé. Bands of quartzite were not so abundant as usual in the country traversed.

In the region around Senafé and Adigrat no very granitoid tract was observed; the beds for the most part do not appear to be highly crystalline. Probably in Hamazen, north of Agamé, the same is the case, as the country is said to be remarkably level. But at Keren, in Bogos, and again about forty miles further to the north-east, near Af Abed and Rairo, in Habab, the rocks are highly granitoid, and even porphyritic, containing large crystals of felspar. For the most part all traces of foliation have disappeared, as is usual in such formations, and the only structure, apart from the crystallization, which can be detected, is the general direction of the bands of rock, often rising into hills. The strike of these corresponds approximately with that of the foliation in the gneiss of the neighbourhood, and every here and there, throughout the area composed of granitoid rocks, the gneissic structure may be traced by searching for it.[1]

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[1] But a few years ago such granites as that above described were looked upon as intrusive rocks, and it was even supposed that the alteration of the metamorphic formations in their neighbourhood was due to them. This view is scarcely yet completely exploded amongst geologists, partly, perhaps, because so few have opportunities for seeing large areas of metamorphic rocks. It is, therefore, well to point out every instance which can be adduced tending to prove the complete similarity in origin of the crystalline non-foliated rocks and of the laminated mica-schist and gneiss. The appearance of the granitoid tracts in Abyssinia is precisely the same as in India, where metamorphic rocks are developed on the most extensive scale, and cover nearly half the peninsula south of the Gangetic plains. With their great opportunities for observation, I believe there is not a single geologist on the Indian Survey who questions the identity in origin of the foliated and non-foliated rocks. The two pass into each other everywhere. The granitoid masses evidently owe their more crystalline condition either to a difference of chemical constitution, original or produced subsequently to their deposition, which rendered them better adapted to the development of the minerals constituting granite

In these granitoid tracts the most prevalent rock is composed of quartz and large crystals of felspar, mica being present, but only in very small quantities. The hills have a most peculiar and characteristic appearance. They are either huge crags with enormous cliffs, the surface of which is not vertical, but curved, or they appear as if composed of monstrous blocks, more or less rounded, and piled upon each other. These peculiar appearances are due to the mode of weathering; the rock, when unaltered, is so compact that water can only penetrate through joints and cracks, and it is consequently in the immediate neighbourhood of these alone that disintegration takes place. As a rule, all rain-water runs off the surface of the rock, and consequently weathering is so slow as to be almost imperceptible on the exposed portion. The accumulation of a little soil and a few plants generally produces a hollow on the surface, and the rock in contact with the soil is usually seen to have undergone change. The result is that, while the exposed portions of the rock remain unaltered, the surfaces of the joints and cracks are gradually disintegrated and washed away, until the blocks, formerly separated by minute fissures, become entirely isolated and detached. In this position, so long as they are exposed on all sides, they are scarcely susceptible of change above, but disintegrate slowly beneath, where they are in contact with soil and vegetation.

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and allied rocks, or to local conditions during the period of metamorphism. As to granite of this kind ever having been fluid, certainly such evidence as I have seen during several years' study of the rocks is opposed to any such supposition.

In ascending the mountains of Tigré from Komayli to Senafé, a gradual decrease in the amount of alteration which the beds had undergone is very perceptible. About the lower portion of the pass, near Suru especially, the rocks are much hardened and changed; but above they are slaty, and in places scarcely crystalline at all. Some beds in the neighbourhood of Senafé are true clay slates; the original bedding, in one instance at least, being still minutely visible. At first these phenomena appear to indicate a gradual diminution in the amount of alteration corresponding with the smaller depth of the rocks from the surface; for it is evident that the deep valleys on the flanks of the Abyssinian mountains have been cut out from the plateau by running water, so as to expose rocks formerly at a depth at least as great as that of the bottom of the valleys below the high ground of the plateau. But it appears most probable that the phenomenon is merely local. The high ground near Halai consists of rocks which are more crystalline than near Senafé, and the most crystalline rocks seen, those above referred to as occurring near Keren and Af Abed, are at elevations of from 3,000 to 5,000 feet above the sea.

The foliation of the metamorphic rocks in Tigré, so far as they were observed, is remarkably constant in direction; its strike rarely deviates more than a few degrees from north and south. The dip is more variable, though it is generally nearly vertical on the highlands; near the base of the hills about Komayli and Hadoda, and again further to the north, about Ain, it is less than 30°. The north and south strike was observed to prevail from the neighbourhood of Ain and Af Abed, in Habab (lat. 15° 55′ to 16° 10′ N.), as far south as the metamorphic rocks were found to predominate on the highlands, and that is to about twenty-five miles south of Adigrat (or nearly 13° 50′ N.), or throughout a distance of upwards of 150 miles from north to south. In the Anseba valley, and around Keren, in Bogos, the strike changes to north-east and south-west; and very possibly this direction may prevail to the northward.

To the constancy of the strike of the metamorphic rocks several of the most important features are due, one of the principal being the direction of the river valleys. No one can have studied the geographical sketches made during the progress of the expedition, of the physical features of the country around the passes, without observing the remarkable manner in which the principal valleys, such as those of Komayli and the Haddas, run for many miles in a north and south direction, parallel to the base of the hills, before debouching into the plain. As the facility with which an excellent military road was made to the highlands was due mainly to the length, and consequently gentle slope, of the ravines traversed, it is very evident that the accessibility of Abyssinia from the sea depends, in a great measure, upon the geological structure of the rocks, and that the foliation of the gneiss was one of the best friends of the British army during its ascent to the highlands.

Reference was made on the previous page to an instance being met with, at the base of one of the hills near Senafé, of the original bedding being still perceptible in a cleaved slaty rock belonging to the metamorphic series. This observation was of much importance; for, as the direction of the planes of cleavage is the same as that of the lamination, viz. north and south and vertical, it is evident that the foliation in this case corresponds with pre-existing cleavage. It is also supported by numerous instances observable in the slaty rocks of the higher part of the pass and elsewhere, in which the character of the planes of division is intermediate between foliation and cleavage.[1] It is, therefore, highly probable, that the high dip, approaching verticality, met with on the highlands is normal, and that the low dips at the base of the hills are due to subsequent disturbance. This disturbance may be of late date, and synchronous with that which has affected the volcanic beds of the coast, which will be described in a subsequent section.

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[1] In a report on the geology of the lower Nerbudda valley in the western part of the Indian peninsula (Mem. Geol. Survey of India, vol. vi. p. 193), I have shown the strong probabilities which exist in favour of gneissic lamination corresponding with pre-existing cleavage whenever the dip is high and the strike constant over large areas. In the Nerbudda area the probability of the direction being due to cleavage was shown by independent evidence. The metamorphics of Abyssinia offer another instance to the same effect, and the rule may be universal. It will be of considerable geological importance if this be established by further observations; for if, as some of our best geologists believe, lamination in metamorphic rocks may owe its direction to either bedding or cleavage, according as the one or the other was the ruling structure in the rock before metamorphism, the regularity and dip of the lamination will afford a test as to which of the two the present direction of the lamination planes should be ascribed.

SECTION IV.

ADIGRAT SANDSTONES.

In the north-eastern portion of Tigré, around Halai, Senafé, and Adigrat, the rock resting immediately upon the metamorphics is generally a massive sandstone. The perpendicular scarps which usually bound the areas formed of this rock, and flank all the valleys cut out of it, are very conspicuous, from their height and their white colour, and they give a very peculiar character to the scenery.

This sandstone—which, on account of its extensive development around the important town of Adigrat, I would propose to call the Adigrat sandstone—is usually white or brown in colour, the former much predominating. Occasionally it is pale brown and lilac, or, as about Takonda, brick red; these colours being chiefly restricted, however, to bands interstratified with the mass of the rock. It is usually very quartzose, frequently felspathic, less commonly argillaceous. Shales of a blue or lilac colour are frequently met with towards the base of the group, but the principal characteristic of the great bulk of the sandstone is its massive character, and the absence of marked bedding, so that the high cliffs of it which form the head of the Haddas and Komayli ravines, and which surround valleys such as Baragit and Guna Guna, south of Senafé, appear as if cut out of a huge unstratified block.

In thickness the sandstone varies; and as the original surface is rarely, if ever, seen, only an approximate idea can be formed. On Sowera it is, by aneroid measurement, about 1,000 feet, or perhaps rather more, as the observation was not taken on the highest peak. About Guna Guna it does not much exceed half that thickness. At Adigrat it appears to be intermediate in amount.

No fossils were met with in this group, although portions of it, the shales especially, were much searched for organic remains. This is unfortunate, for its position in the geological series can only be approximately determined. By Messrs. Ferret and Galinier it was classed, with doubt, as tertiary. There can be but little doubt that it is much older than this, from its relations to the Antalo limestone; but its true age is still uncertain.

As above remarked, it invariably rests upon the metamorphics; no other rocks have been observed to intervene. In the neighbourhood of Senafé and Adigrat, the only rocks seen resting upon it are traps, which are apparently conformable at the latter place, but quite unconformable at the former. Their relations to the sandstone will be described further on.

About twenty-five miles south of Adigrat, at Mai Dongolo or Wugula,[1] sandstones are seen to dip below the Antalo limestone. The Adigrat sandstone is traced, almost without a break, from the neighbourhood of Halai, Takonda, and Senafé, to within about six miles east of Dongolo; but then there is a break, and metamorphics intervene, so that the beds at Dongolo are not connected with the mass of the formation. They differ also in colour, being red; and instead of being horizontal, as at Adigrat and generally throughout Northern Tigré, they dip at a considerable angle to the southward.

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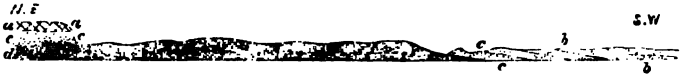
[1] Not Agula, the name given to another camp, which is ten miles further south.

These differences do not appear to be of much importance. The colour of the sandstone is occasionally red everywhere, and is very liable to vary; and although the greater portion of the formation is perfectly horizontal, it does dip in places. Besides, the Antalo limestones are also horizontal in general, although they too are considerably inclined near Dongolo. Moreover, the sandstone, a little farther west than Dongolo, forms massive craggy hills, standing out above the plain of the metamorphics, which is higher than the valley in which Dongolo lies; and these crags, although formed of inclined beds, resemble closely those of the Adigrat sandstone further to the eastward and northward; indeed, they have all the appearance of being outliers from the Adigrat hills. The accompanying sketch section will give some idea of the apparent relations of the



Sketch section of relations between trap, limestone, sandstone, and metamorphics near Dongolo : *a*, trap ; *b*, limestone ; *c*, sandstone ; *d*, metamorphics.

beds near Dongolo, the vertical dimensions being, of course, greatly exaggerated. The mineral character of the sandstone at Dongolo is precisely similar to that of the Adigrat beds in general.

No trace of the sandstones was observed further south on the road to Magdala ; all the beds seen were higher in the series, except at one spot, near the camp at Dolo, where a small boss of granite emerges from beneath the limestone. This small patch is so minute that it affords no means of judging whether the sandstones to the southward underlie the limestone or not. Both formations are, of course, quite unconformable to the metamorphics, and rest upon an uneven surface of them, so that peaks of the latter may rise through all the former sedimentary formations, and only be capped by the highest.

Passing northward from their southern boundary at Dongolo, the sandstones, as already intimated, cover a considerable tract around Adigrat, and form the lower portion of the great hill-range west of that town ; thence, to the north, they cross the highest portion of the dividing range between the streams running down to the Nile basin on the west, and those flowing to the salt plain west of Amphila to the east. Their area is very narrow as far as Senafé, but here they expand into two or three broader plateaux, which encircle the upper portions of the Komayli and Haddas valleys. The most eastern of these plateaux is Sowera, north-east of Senafé. Further still to the north-east and east, sandstone caps some of the isolated ridges running north and south between the highlands and the plains near Annesley Bay. One such cap is seen north-east of Sowera on the opposite side of a deep ravine. Another lies east-south-east of Sowera. A third is not seen from the highlands, but was found at a much lower level in the hills further east towards Arafilé by Lieutenant Holditch, R.E., of the Trigonometrical Survey.

The whole of the Sowera plateau consists of sandstone, but the rock ends somewhat abruptly on the Asawat plateau between the Haddas and Komayli ravines, and also west of the former, near Halai, which village stands on metamorphic rocks. It is curious that the northern part of each plateau, which consists of metamorphics, is higher than the southern part. This shows on how uneven a surface the sandstone was deposited. The limit of that formation nearly corresponds with an east and west line on both sides of the Haddas valley, but there does not appear good evidence of faulting. On the plateau of Hamazen, north of Halai, there is said to be no sandstone.

The sandstone plateaux are covered with thin jungle, and do not appear to be sufficiently fertile for cultivation in general, except where a richer soil is derived from trap rocks in the neighbourhood, as is the case near Adigrat.

The extent of the sandstone to the westward was of course not determined. Looking from the verge of the scarps near Takonda, it appears that for some distance metamorphics prevail, but that the sedimentary rocks recur on some ranges beyond Dixa.

It is possible that the beds associated with coal in the Chelga district may be of the same age as the Adigrat sandstone. It is very much to be regretted that the problem of their age, one of the most interesting geological questions in Abyssinia, could not be solved.[1]

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[1] I would venture to suggest the possibility that both the coal-bearing beds of Chelga and the Adigrat sandstones may belong to a portion of the great series associated with coal in India—the Damudas and their associates of the Indian Survey classification. This, of course, is mere surmise, and my only reason for thinking it probable is the resemblance between the fossils of the dicynodont beds of South Africa and the Panchets of India, and the want, so far as is known, in Equatorial and Southern Africa, as in great part of Southern Asia, of marine representatives of the upper palæozoics and lower mesozoics of Europe.

SECTION V.

ANTALO LIMESTONES.

NEXT above the sandstone in ascending order is a thick group of limestones, which rest upon the Adigrat beds at Mai Dongolo in the manner described in the last section, and thence cover the country for a distance of seventy miles along the route, as far as about twenty miles south of Antalo. They extend also for a very considerable distance east and west.

For twenty miles south of Dongolo the limestone is not accompanied by any other rock. It is usually in thin beds of a grey colour, less commonly ochreous, and it much resembles some of the beds of lias limestone in the south-west of England. The rock, when broken, is compact and earthy, or but slightly crystalline in general.

Further south, towards Antalo, although limestone is still the prevailing rock, some beds of sandstone and of trap are interstratified; the former especially prevailing towards the upper part of the group. The hill of Gutba Hariat, behind Antalo town, appears to be in great measure composed of sandstone; and so are the beds immediately beneath the trap in the Meshek valley, south of Antalo. These sandstones differ in character from the Adigrat beds. They are less quartzose, being both more earthy in composition and darker in colour, and they contain large quantities of conglomerate.[1]

The trap is always doleritic, and usually compact basalt. Beds of it are seen at Mai Makdam, between Agula and Dolo, but they are irregular, and have rather the appearance of outliers of a higher formation, deposited on an irregular surface of limestone, than of interstratified lava flows. Farther south, however, and especially between the camp at Buya, near Antalo, and Meshek, there can be no question of the basalts being contemporaneous. One bed at Masgi, the first camping-ground south of Antalo, is about one hundred feet thick, as nearly as could be measured with an aneroid on the hill-side.

As a rule, the Antalo limestone is horizontal. It does not, however, preserve the same unbroken lines as the sandstone near Adigrat, but rolls about slightly everywhere. In places it is much disturbed, as at Meshek.

The scenery is peculiar. The limestone forms cliffs, of no great height in general, along the sides of the valleys, all of which contain streams, and have a striking character, due to the nearly perpendicular sides and the narrow flats covered with grass and bushes at the bottom. Except in the valleys, the soil is poor, and only low scattered scrub occurs on the hills. The latter are a rolling upland, very distinct from the plateaux of sandstone or the terraced ridges and rounded hummocks of the trap.

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[1] There is, of course, the bare possibility that these sandstones at the top of the Antalo group, and not those of Dongolo, represent the Adigrat beds. For the reasons given in the text, I think this highly improbable. The sandstones of Antalo and Meshek have every appearance of being an integral portion of the Antalo beds, and limestone more or less impure is mixed with them. No limestone whatever occurs either at Dongolo or in the Adigrat beds. The only reason I am acquainted with for supposing the limestone to be of higher antiquity than the sandstone of Adigrat is, that the former is less persistently horizontal than the latter, the beds usually rolling about slightly. This may be due to local causes, but it is almost universally the case in thick groups of beds, when the strata themselves are not massive, and especially so amongst limestones.

Where the Antalo group rests upon the Adigrat sandstones at Mai Dongolo, the two formations are apparently conformable. Whether they are so throughout it is impossible to say; there was not time for sufficient exploration of the country to determine the question. The non-occurrence of any limestone upon the sandstones of Adigrat and Senafé is opposed to the idea of the two being conformable. A similar doubt rests upon the relations of the lower series of traps with the limestone, as will be seen in treating of the volcanic rocks in the next section.

This want of opportunity for determining precisely the relations of the limestone to the rocks above and below is the more to be regretted, as the present is the only group which has yielded fossils. Organic remains abound in it, as so frequently occurs amongst limestone; but in general they consist only of oysters, half-defaced casts of bivalves, and spines of *Echinodermata,* none of which are of much value for affording determinations of age. For a long time it seemed to me as if similar ill-preserved specimens were the only fossils to be found, and during the hurried march to Magdala nothing of any value was obtained; but when returning it was possible to devote a couple of days to examining the neighbourhood of Agula and Dongolo, and the search was rewarded by the discovery of a few species in better condition. Of these the following is a list:[1]—

ECHINODERMATA—
- † *Hemicidaris Abyssinica*, sp. nov.
- *Cidaris*, ? sp. a fragment.

MOLLUSCA LAMELLIBRANCHIATA—
- *Ostrea*, sp. near *O. Jonesiana*, Tate.
- *Gryphæa*, sp.
- *Pecten*, sp.
- *Trigonia costata*, Sow. var. *pullus*.
- *Modiola Baini*, ? Sharpe.
- *Modiola imbricaria*, Sow. var.
- † *Mytilus Tigrensis*, sp. nov.
- *Cyprina*, sp. cast.
- *Tancredia*, sp.
- *Isocardia*, ? sp. cast.
- *Tellina*, perhaps two species, casts.
- *Ceromya concentrica*, Sow.
- *C. similis*, Sow.
- † *C. paucilirata*, sp. nov.
- † *Pholadomya sublirata*, sp. nov. near *P. recurva*, Ag., and *P. concatenata*, Ag.
- *P.* sp. near *P. antica*, Ag.
- † *P. granulifera*, sp. nov.

GASTEROPODA—
- *Natica*, sp. casts.
- *Alaria*, sp. do.
- *Cerithium*, sp. fragmentary.

(† For the descriptions of the new species, see Appendix to this part.)

The species of *Hemicidaris*, *Pholadomya*, *Ceromya*, *Trigonia*, and *Alaria* are all of characteristically oolitic forms, and amply suffice to determine the series to which these limestones belong. The fauna has a general resemblance to that of the middle Jurassics, but the evidence is scarcely sufficient to justify any decided conclusions in matters of detail.

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[1] I am greatly indebted to my friends Dr. Stoliczka and Mr. Etheredge for aid in determining these fossils.

The occurrence of trap beds interstratified with the limestones is very interesting, because it indicates a commencement, in the oolitic period, of the great series of volcanic effusions, the remains of which still cap so many of the Abyssinian mountains. It also shows that the earliest lava-flows must in all probability have been submarine, like the limestones with which they are intercalated. It is worthy of note that the earliest great outburst of traps of known age in India is also Jurassic.

SECTION VI.

TRAPPEAN SERIES.

THE greater portion of the Abyssinian plateau, with the exception of its north-eastern corner, is known to be covered by volcanic rocks. Much has yet to be done before their geology can be properly ascertained. No opportunity was afforded during the expedition of visiting the remarkable trachytic ranges around Adowa, and it can only be inferred from the form of the hills that the rocks are similar to those of Senafé. Far to the south in Shoa the trap rocks, as described by M. Rocher d'Héricourt,[1] appear to correspond with those of the neighbourhood of Magdala. From the accounts given by Messrs. Ferret and Galinier, Dr. Rüppell, and others, it is evident that the high mountains of Simen and the whole country around Lake Dembea consist of the same bedded traps. By the kindness of Dr. Beke I have been allowed to examine a series of specimens collected during his journeys in Central Abyssinia, which entirely confirm these accounts, and prove that the rocks of the hills on the banks of the Abai, and those both north and south of Lake Dembea, are precisely similar to the traps of Lasta.

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[1] Bull. de la Soc. Géol. de France, 1846, p. 543.

On the route to Magdala volcanic rocks were first met with at Senafé, where several hills consist of trachyte passing into claystone and basalt. Trap hills, chiefly of trachyte, are dotted over the country to the southward as far as Fokada, a distance of nearly thirty miles. Here a great range of bedded traps commences, and extends for about twenty-five miles to the south, passing to the west of Adigrat. From a little south of that town no volcanic rocks were met with, except the beds mentioned in the last section as occurring interstratified with the Antalo limestones, until some distance south of Antalo; but at Meshek, two marches beyond that town, the route entered high ranges entirely composed of trap, and thence no other rocks were seen as far as Magdala.

In the Meshek valley and in other valleys to the south, especially at Atala, Aiba, and Belago, it is very plainly seen that the trappean rocks belong to two distinct and unconformable groups. The lower of these is much inclined, while the higher rests on its upturned and denuded edges. In this part of the country the two groups are easily distinguished by the absence of disturbance in the higher beds. Nothing can be more complete than the evidence of unconformity. Of these two groups the lower or inclined beds may, for the sake of distinction, be called the Ashangi group, from their development around the lake of that name, and the higher or horizontal beds the Magdala group. They are evidently of different geological age, and require separate description.

A. ASHANGI GROUP OF TRAPS.

The lower group consists entirely of doleritic rocks. The basalts, of which it is principally composed, are usually amygdaloidal, containing nodules of agate and zeolite, frequently coated with green earth. The zeolite is usually white or orange-coloured stilbite. Beds of volcanic ash or breccia frequently occur, and often contain augite crystals. Not unfrequently the rocks composing this group are much decomposed, and have a red colour, a sure mark in general amongst basaltic rocks of alteration by atmospheric action. Some beds are scoriaceous.

At Atala and Aiba these beds are only seen in the bottom of the valleys, but from the Ferra pass near Belago they extend far to the south, the greater part of the hills around Lake Ashangi being composed of them, and probably all the country thence to the southward as far as the upper Tellari valley. The distinction between the two groups was not made out in time to allow of their being separated further to the south, and it is impossible to say now whether the beds exposed in the Jitta and Bashilo valleys belong to the present division or not. There can be but little doubt that the rocks seen in the bottom of the upper Takkazzyé valley are a part of the Ashangi group, and probably the same are exposed in the much deeper gorges near Magdala. They have not, however, been represented as occurring on the map south of the Tellari, and their boundaries throughout are merely approximate.

The only place where the Ashangi traps were seen to rest on the lower rocks was in the Meshek valley. Here the geology is greatly confused, the Antalo limestones and their associates being much disturbed and contorted. Above them are seen inclined basaltic beds belonging to the Ashangi group, capped by the horizontal Magdala traps. The Ashangi beds appeared to be unconformable upon the sandstones and limestones beneath them, but the intricacy of the geology was too great, in a country much covered by bush and tree jungle, to enable this to be determined with certainty in a single morning, all the time that could be devoted to its examination. *A priori*, there is of course a probability that these inclined beds might belong to the same series as the limestones, in which, as has been shown, beds of basalt are interstratified, especially towards the top; but the sections seen at Meshek were opposed to this view. Still, it cannot be considered as absolutely disproved.

Nothing, however, can be considered as ascertained concerning the age of these traps, except that they are not older than oolitic. In mineral character, they strikingly resemble the great trappean series of Western India; the resemblance even extending to such minute peculiarities as the frequent occurrence of agate or zeolite covered with green earth, and the existence of a peculiar porphyritic basalt with tabular crystals of felspar. The age of the Indian traps has of late been shown to be almost certainly, in great part at least, upper cretaceous; but resemblance of mineral character is hardly sufficient alone to connect rocks in countries so widely distant from each other as Abyssinia and Bombay. Still, as somewhat similar beds are known to occur in places along the coast of Arabia, underlying the nummulitic series, just as the Bombay traps do in Guzerat and Cutch, it is a very interesting question for future investigation, what connexion exists between the various upper secondary or lower tertiary bedded traps of South-western Asia and Eastern Africa? Should they be proved to have been formerly connected, and to be portions of the same great ancient volcanic region, an idea which seems by no means improbable, their study will become one of very great interest as connected with the geological history of the earth's surface. In every respect the bedded traps are very remarkable, and deserving of far more attention from geologists than they have hitherto received. Nothing resembling them has yet been shown to be in process of formation upon the earth's present surface, and their mode of origin is still extremely obscure.[1]

B. MAGDALA GROUP OF TRAPS.

The higher volcanic beds are distinguished petrologically from the lower mainly by the frequent occurrence of thick beds of trachyte, usually more or less crystalline, and not unfrequently containing small beautifully-formed glassy crystals of felspar with rounded angles.

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[1] I have endeavoured, in a paper on the "Traps of Western India," published in the "Memoirs of the Geological Survey of India," vol. vi., to bring together all that is known as yet concerning the bedded traps of that country. A great part of the description is equally applicable to the rocks of Abyssinia.

These beds usually weather with a remarkably precipitous scarp, and being of considerable thickness and perfectly horizontal, they are unusually conspicuous. To them is due in a great measure the great difficulty of access of most of the high ranges, and especially of the ambas or hill-forts, which are so abundant in Abyssinia. The higher ranges are perhaps as fine an example as could be found of the terraced ridges which are so characteristic of bedded traps. There is a remarkable resemblance to the scenery of the Western Deccan and the higher valleys of the western ghats in India, but the peculiarities of the landscape are exaggerated in Abyssinia.

Many of the trachytic beds are brecciated, and several are highly columnar. The dolerites associated with them are usually compact, amygdaloid being less abundant than in the Ashangi beds. Still it is far from uncommon, and the nodules are occasionally enveloped in green earth. An instance of this was observed at the crest of the Alaji pass between Meshek and Atala.

Sedimentary rocks are interstratified with this series in places, as in the gorge of the Jitta river, and again near Magdala. The beds met with were white argillaceous rock at both places, and, at the Jitta alone, coarse sandstone and black shale. The sections have been described in the first part of this work. The beds do not appear to extend for any distance.

No fossils could be found:[1] there is consequently nothing to indicate the geological age of this very interesting group of traps. No other formation was seen resting upon it; it caps all the highest hills observed.

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[1] I was informed by Dr. Schimper that when King Theodore made his military road for the transport of his guns across the Jitta gorge, some petrified trunks of trees were met with in the sandstone.

It is highly probable that the trap rocks of Shoa belong, in part at least, to this group. No idea can be formed of their extension further south, nor is it possible to say whether the trappean formations which cover so large an area in Central Abyssinia should be referred to the Magdala or the Ashangi group. In all probability both are represented. There can be but little doubt, however, that the traps on the hills west of Adigrat belong to the higher group. Although the lower beds consist of basalt alone—and from want of time it was impossible to examine the higher hills—the cliff-like scarps are just as conspicuous amongst them as farther south; and these appeared, wherever they could be examined, to be characteristic of the trachytes. The conformity to the Adigrat sandstone is in all probability only apparent.

The volcanic rocks of the neighbourhood of Senafé differ from those of Adigrat and the south in the absence of any marked bedding, and to some extent also in mineral character. They consist chiefly of trachyte, but this is frequently so fine-grained and compact, that even with the aid of a lens it is very difficult to distinguish it from a sedimentary rock, being in fact what is generally termed claystone. The crags just west of the camp at Senafé were most naturally mistaken by everybody in the army for sandstone.[1] These hills are rounded hummocks of a very peculiar shape. Many more of similar form occur to the westward, and the range near Adowa presents a very similar appearance, and consists, in all probability, of the same rock.

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[1] As already mentioned, it was some time before I was myself undeceived

These traps rest in places upon the metamorphics, but in general upon the Adigrat sandstones, to which they are quite unconformable. Although they are not generally bedded, there is in places, as on Akub Teriki hill, an appearance of distinct strata; and the various trachyte hills to the south, towards Guna Guna and Fokada, have much the appearance of being the remnants of one thick lava flow.

Taking into consideration their different mineral character and mode of accumulation, the Adowa and Senafé traps have much the appearance of belonging to a distinct group from the beds of Ashangi, Magdala, and Adigrat, and their much greater apparent unconformity to the sandstones beneath would favour the idea of their being more recent than the rocks of the Adigrat hills. If they be so, then their age must be very much less, for there can be but little doubt that the traps of the Adigrat hills had formerly a much greater horizontal extension: they are doubtless merely the remains of beds which once covered the whole country to a depth probably of 2,000 or 3,000 feet, and all of these must have been swept away again at Senafé before the volcanic formations of Akub Teriki and the neighbouring hills

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in this matter. Where the rock is slightly decomposed, as it generally is, it is almost impossible to distinguish it from an argillaceous sandstone. Dr. Rüppell took these rocks for hardened marl.

were poured out. It appears more probable that the latter rocks are really contemporaneous, and that their irregularity is due to their accumulation in the immediate vicinity of active vents,—to their having been, in short, part of a volcanic focus. The deep beds of Akub Teriki may be the intrusive mass of the vent itself. The remaining hills, where thick trachyte rests on sandstone, may be parts of an old lava flow of great depth. Near Fokada there is evidence in favour of a passage from the Senafé traps into those of the neighbourhood of Adigrat. It therefore appears most probable that all belong to one group.

forms, and amply suffice to determine the series to which these limestones belong. The fauna has a general resemblance to that of the middle Jurassics, but the evidence is scarcely sufficient to justify any decided conclusions in matters of detail.

The occurrence of trap beds interstratified with the limestones is very interesting, because it indicates a commencement, in the oolitic period, of the great series of volcanic effusions, the remains of which still cap so many of the Abyssinian mountains. It also shows that the earliest lava-flows must in all probability have been submarine, like the limestones with which they are intercalated. It is worthy of note that the earliest great outburst of traps of known age in India is also Jurassic.

interstratified with which are sedimentary rocks, sandstones, and conglomerates.

As a rule these beds are inclined, and present the appearance of having been much disturbed. The beds of the Buri peninsula were only examined in one spot. Those of the neighbourhood of Zulla are most irregular in dip, whilst in the tract west and north-west of Massowa, with some irregularity, there is a very constant general dip towards the sea to the eastward.

The sedimentary beds contain a mixture of sand, ashes, and rolled fragments of both volcanic and metamorphic rocks. Fossil shells are said to occur in places; unfortunately nothing was met with except some fragments insufficient for determination.

At the south end of Annesley Bay, just south of the Turkish port at Arafilé, there is a cone composed of fine volcanic ash. From its form this cone is evidently of recent origin. About two days' journey to the south there is said to be an active volcano.

Although there can be but little doubt of the recent date of a large portion of this series, the great amount of denudation which parts of it have undergone around Zulla and Massowa,[1] where no trace of the original volcanic vents can be detected, and the very considerable disturbance which has affected the beds, prove that some portions of the series are of ancient date, and that the geological period during which they have accumulated must have been of long duration. It is unfortunate that no good specimens of the fossil shells occurring were found near Massowa, as by comparison of them with the species living in the Red Sea some idea could be formed of the change which has taken place. The beds met with near Massowa must have been, in part at least, of littoral or sub-littoral origin, for the shells which occur in them are evidently marine. Yet if the accumulation took place along the coast, it is strange, unless the character of that coast has altered greatly, that shells and corals are not exceedingly abundant instead of being rare. It is very probable that, while some of the sedimentary beds are littoral, others are of sub-aërial origin, and that their materials were washed by streams and floods over the surface of the volcanic beds, like the gravels mentioned in the next section.

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[1] The same is the case at Aden.

The volcanic series appears to rest on metamorphic rocks, in places at least, both on the Abyssinian and Arabian coasts.[1] In both cases, so far as is known, it forms a fringe of varying breadth.

Hot Springs.—The great prevalence of hot springs along the Abyssinian coast is doubtless connected with the volcanic formation. Two of the best known of these are that at Ailat, about thirty miles west of Massowa (temp. 150° Fahr.), and that of Atzfut, about eight miles south of Zulla (temp. 140° Fahr.). The latter is brackish, and probably contains some sea-water, as it issues close by the shore; the former is excellent, and supplies the village of Ailat.

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But all subterranean waters in the neighbourhood of Zulla appear to have an unusually high temperature. The water in some of the wells at Komayli was decidedly warmer than that in others when they were first dug; and in a well sunk by the Punjab Pioneers about five miles from the sea, in the plain near the line of railway made by the army from Zulla to Komayli, the temperature was about 105°,[1] considerably higher than the average in air. The abundance of hot springs in the Danakil country has been noticed by M. Rocher d'Héricourt and others.

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SECTION VIII.

RECENT FORMATIONS.

Alluvial Deposits near the Coast.—The plain around Zulla consists of alluvium, doubtless deposited by the Haddas and Komayli streams. It extends to the Gadam hills and to the spur of volcanic rocks stretching away from the south end of the range. Beyond this spur another plain, which is continuous with that along the seashore to the southward, extends to the foot of the mountains at Wia Hadoda and Komayli. This plain consists of beds of sand and gravel, evidently deposited by streams from the hills. At the entrance to each ravine the plain is raised considerably by the accumulation of detritus brought down by the torrents.

The spurs of the Gadam range almost reach the sea, an exceedingly narrow plain intervening. This plain is almost equally narrow near Arkiko. The island of Massowa and the coast, for some distance at least to the northward, are of coral formation. Northwards from Massowa, however, the country for many miles from the sea is covered by an accumulation of pebbles and boulders of metamorphic rocks and trap. In places, as near Amba, about thirty miles north-north-west of Mas- [illegible]se beds form flat-topped rises of no great height, evidently the remains of a plain, the greater portion of which has been cut away by streams and surface-waters. Further north the plain still exists unbroken by ravines, and forms the desert tract known as Shob. From the quantity of boulders and pebbles, and the scarcity of corals and shells, there can be but little doubt that this plain has not been formed by the sea, but is a deposit from the wash of rain and floods from the hills. As already remarked, the sedimentary beds interstratified with the volcanic rocks of the neighbourhood are probably, in great part at least, of similar origin.

Coral Formation of the Red Sea Coast.—The island of Massowa and the coast in the neighbourhood are composed of fragments of corals, with shells and sand, agglutinated together into an impure limestone rock. A large number of the islands fringing the coast in this part of the Red Sea are of the same formation, and from the descriptions given it is highly probable that the islands of the Dahalac Archipelago are all similar.

All these islands are perfectly flat, and stand about twenty or thirty feet above high-water mark,[1] being surrounded by a low cliff of that height. A reef extends for a varying distance outside of them, and terminates abruptly. Doubtless the island was formerly co-extensive with the reef, but so much of the rock as is exposed to the influence of the breakers has been swept away by the sea. The reef is naturally broadest in the direction from which the heaviest breakers come, the open sea.

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[1] In the island of Massowa, the eastern or seaward side is much higher than the other.

From the small opportunity that was afforded of examining this formation, nothing can be added to what is already known of it.

Soils of the Abyssinian Highlands.—The great fertility of Central and Southern Abyssinia, the home, from time immemorial, of one of the few African nations which have risen above the savage state, is doubtless due, in a great measure, to the prevalence of trap rocks. Upon the sandstones and limestones of Tigré vegetation is poor and sparse; on the metamorphic rocks the soil is better; but it is only on the traps, or in their neighbourhood, that it is really rich.

The most interesting circumstance connected with the Abyssinian soils is, that wherever basaltic rocks prevail there is found a very fertile, somewhat argillaceous soil, black or dark brown in colour, opening into cracks in hot weather, and in every way resembling the well-known "regur" of Central, Western, and Southern India. Precisely as in India, moreover, this soil appears peculiarly suited to the growth of grasses and cereals,[1] but less adapted for forest, perhaps because the luxuriant grass chokes the growth of the larger plants. This soil does not appear to be met with far from basaltic rocks, although plains of it may occur upon other formations, as at Buya, the site of the British camp near Antalo. In this and similar cases, it is highly probable that the soil has been derived from the traps which cap the neighbouring hills, and probably formerly existed over the plain, but have been removed by denudation. As no thickness of soil is generally found upon the limestones, that which covers the Buya plain can scarcely be derived from them.

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[1] Wherever the climate is sufficiently warm, this soil is doubtless admirably suited for cotton also. So much is this the case in India, that the soil in question is commonly known as "cotton soil."

This black soil of Abyssinia, moreover, appears to be only derived from the disintegration of dolerites, not from trachytes. The two are usually intermingled, so that the soil upon the hills is derived from both: but on the plateau of Dalanta and Wadela, between the Takkazzyé and Jitta rivers, the route from Santara to Gaso traverses a region of trachytic rocks alone, and the soil is light-coloured; whilst from a little south-west of Gaso to the Jitta, and again on the plateau between the Jitta and Bashilo, the rock is basaltic and the soil black. Of course it will be found that black soils are met with elsewhere; any soil which accumulates under marshy conditions is usually dark-coloured: but the interesting circumstance is the constant association of a peculiar soil, dark in colour, and well suited for the cultivation of cereals and cotton, with basalts and other doleritic rocks.

Flakes of Obsidian.—In many places, small chips of obsidian are found scattered about, frequently far from any locality where the rock is met with *in situ.* From their peculiar form, and the nature of the facets, there can be little or no hesitation in attributing these to human manufacture. They are evidently the chips struck off in the process of manufacturing stone implements, and are perfectly identical in shape with similar chips found extensively in Europe and India.

A few were met with near Zulla, some were picked up on the highlands, and two or three in the neighbourhood of Magdala. But a much larger number were found at Rairo, near Af Abed in the Habab, in the centre of a granitoid country, and with no volcanic formation nearer than the hills between Ain and the sea, at least twenty miles distant. The fragments found are of no special beauty; no well-formed implements were obtained; and the occurrence of such chips is simply interesting, as adding one more to the numerous countries in which traces of the early use of rude stone implements by mankind have hitherto been found.

SECTION VII.

ADEN SERIES OF VOLCANIC ROCKS.

ALONG both shores of the Red Sea and of the Gulf of Aden there is known to be a great development of volcanic rocks. There is every probability that these, so far as they are known, belong to one series; and as some active volcanoes still exist in the sea, and cones quite unchanged in form, and evidently of very recent date, abound in many places along the coast, it is clear that the series is still in process of formation, and that it is, in part at least, of recent date.

These volcanic formations are but sparingly represented on the west side of Annesley Bay. They appear, however, to compose the greater portion, if not the whole, of the Buri peninsula east of the bay, and they are developed to a considerable extent west of Massowa.

In mineral character they differ entirely from all the volcanic rocks of the highlands, and there cannot be the slightest hesitation in assigning to them a totally different and much more recent geological age. They consist, in the neighbourhood of Annesley Bay and Massowa, of basaltic trap and of ash, both frequently scoriaceous, interstratified with which are sedimentary rocks, sandstones, and conglomerates.

As a rule these beds are inclined, and present the appearance of having been much disturbed. The beds of the Buri peninsula were only examined in one spot. Those of the neighbourhood of Zulla are most irregular in dip, whilst in the tract west and north-west of Massowa, with some irregularity, there is a very constant general dip towards the sea to the eastward.

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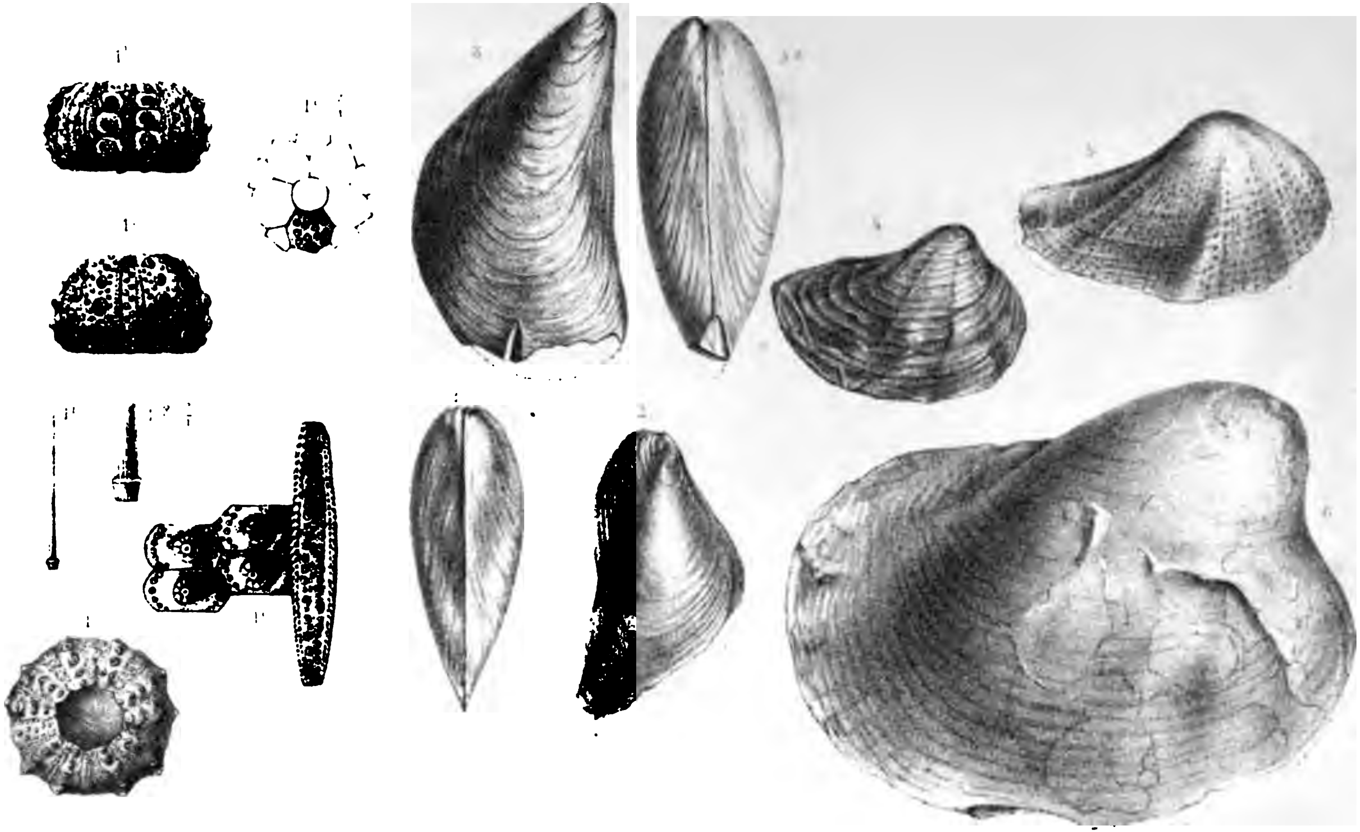

APPENDIX.

DESCRIPTIONS OF THE NEW SPECIES OF FOSSILS FROM THE ANTALO LIMESTONE.

HEMICIDARIS ABYSSINICA, sp. nov., fig. 1.

Testa depresso-globosa, vel sphæroidea, vel subtus plana, supra fere hemisphærica. Areæ ambulacrales subrectæ, strictæ, tuberculis parvis, subæqualibus, vix superne minoribus, fere æquidistantibus biseriatim alternantibus et granulis irregulariter interspersis ornatæ. Areæ interambulacrales seriebus duobus 8-9 *tuberculorum majorum instructæ tuberculis utrinque granulis circumdatis, aliis granulis minoribus sæpe irregulariter ad margines laminarum interjectis; laminis latioribus quam altis. Os magnum decies incisum. Spinæ elongatæ, cylindricæ, longitudinaliter subobsolete striatæ, circa* 1½ *mm. a basi angulatim dilatatæ, ibidem et ad basin granulis circumdatæ; spatio intermedio lævi, lente et regulariter attenuato.*

Var. depressæ ratio diam. : *alt.* : : 1 : 1·9.
Var. subhemisphæricæ id. : *id.* : : 1 : 1·5.

THE principal characters of this form are the small and generally equal size of the ambulacral tubercles, and their arrangement: those in the two rows alternating at subequal distances, towards the lower portion of the ambulacral areas especially; near the anus they become much smaller, and run much closer together. The rows of ambulacral pores are not flexuous above, but close to the mouth they become zigzagged and slightly irregular. The interambulacral plates are broader than high. The number of tubercles, which varies from eight to nine, or even ten, including a very small one close to the mouth (being rarely seven in very small specimens), is greater than in most allied forms. The spines, many of which occur with the shells, are long, with the remains of longitudinal striation visible upon them: the shoulder near the base is rather wide and granulated, the base also granulated, the intermediate portion shaped like the frustum of a cone. The granulation of the shoulder is very slight, and easily disappears with weathering, so that many spines appear as if not granulated here: the granulation corresponds to the terminations of the longitudinal striæ. The apical disc is ill-preserved or wanting in all the specimens found.

The nearest approach to this form appears to me to be made by *H. Wrightii*, Cotteau (not of Desor), " Echin. foss. Dep. Yonne," p. 294, pl. xlii.; the only differences being that that species has broader, and consequently fewer, interambulacral plates, that the rows of pores bordering the ambulacral areas are much more flexuous, that the ambulacral tubercles do not alternate, and that the spines are differently terminated at the base. From most other species, such as *H. Luciensis*, D'Orb., *H. intermedia*, Forbes, &c., the present form is distinguished both by its more numerous interambulacral plates, and also at once by the small and subequal size of the ambulacral tubercles, as well as by the form of the spines where the latter are known.

Hemicidaris Abyssinica—found rather abundantly in a bed at the base of the Antalo limestone, close to the camp at Mai Dongolo, four marches north of Antalo and three south of Adigrat. Many of the specimens are in excellent order, and the spines abounded in the bed, in some cases attached. Spines, of the same species apparently, were met with here and there throughout the Antalo limestone.

EXPLANATION OF FIGURES.

a. Subhemispherical variety, natural size.
b. Depressed spheroidal ditto, ditto.
c. View from below ditto.
d. Ambulacral segment and four interambulacral plates, enlarged two diameters.
e. Apical disk, enlarged two diameters.
f. Spine, natural size.
g. Base of ditto, enlarged two diameters.

MODIOLA IMBRICARIA, SOW. var., fig. 2.

This is so near some English specimens that there appears no reason for distinguishing it. The rib running from the umbo to the neutral margin is rather nearer to the posterior side, and the shell is generally broader in proportion at the extremity remote from the beaks. I consequently give a figure, but I think it unnecessary to propose a new name.

MYTILUS (? MODIOLA) TIGRENSIS, sp. nov., fig. 3.

Testa irregulariter pyriformis, conico-subovata, concentrice plicato striata, versus umbones tumida, antice convexa, postice plana obliqua, margine antico longe recto, tunc convexo postico fere recto, post medium concaviusculo, ventrali regulariter convexo.

Long. 50, *diam. postic.* 26, *crass.* 27 *millem.*

A few well-preserved specimens were found with the last. This shell approaches *M. sublævis*, Sow., but it is more rounded, the posterior side not being so flat, and the umbones are more obtuse.

PHOLADOMYA GRANULIFERA, sp. nov., fig. 4.

Testa inæquilateralis, parum tumida, ovato-elongata, concentrice striata, punctis in seriebus confertis radiantibus dispositis pulchre ornata, costâ obtusâ unâ submedianâ ab umbone ad marginem decurrente, aliâque posteriori instructa; latere antico juxta umbones breviter obliquo, tunc rotundato postico elongato, margine dorsali concaviusculo ventrali convexo, extremitate posticâ oblique truncatâ, umbones prominentes, convergentes; area immersa glabra.

Long. 40, *lat.* 25, *crass.* 17 *millem.*

Found near Agula. Only two specimens were obtained. A very peculiar and unusual form of *Pholadomya*, with radiating rows of puncticulations, somewhat allied to the shell figured by Buvignier as *Panopæa punctifera*, Buv., from the coral rag (" Statistique Geol., &c., Dep. de la Meuse," pl. viii. figs. 8—11).

PHOLADOMYA SUBLIRATA, sp. nov., fig. 5.

Testa valde inæquilateralis, mediocriter tumida, elongato-subovata, concentrice striata, costis radiantibus subobsoletis medianis duobus, posticis confertioribus 3-4 *difficilissime notandis, anticâ nullâ, omnibus versus marginem ventralem evanescentibus; latere antico juxta umbones declivi, tunc rotundato, dorsali subhorizontali, extremitate posticâ subangulatâ, margine ventrali convexo; umbones parum prominentes, convexi.*

Long. 33, *lat.* 25, *crass.* 19 *millem.*

Found with the last. Although much less peculiar than *P. granulifera*, this is also a well-marked form, distinguished by the few and subobsolete ribs, thus being one of the passage forms between *Pholadomya* and *Myacites.* The nearest described species appears to be *Ph. concatenata,* Agass., from the lower oolite of Poland.

CEROMYA PAUCILIRATA, sp. nov., fig. 6.

C. excentricæ *persimilis, sed liris concentricis magis distantibus, haud postice angulatis. Testa subrhomboidalis, truncato-ovata, valde inæquilateralis, umbonibus tumidis, subterminalibus, margine dorsali horizontali, postico rotundato, ventrali parum convexo, antico fere verticali.*

Long. 75, *lat.* 53, *crass. circa* 60 *millem.*

A single specimen was obtained with the *Pholadomyæ*, and accompanied also by *Ceromya similis* and *C. concentrica*.

PART III.

ZOOLOGY.

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INTRODUCTION.

THE earliest contribution to the Abyssinian fauna was contained in the last (fifth) volume of Bruce's Travels. In the original edition of 1790 several plates representing various plants and animals of North-eastern Africa were given, accompanied by descriptions, which, like all of Bruce's writings, show great power of observation, though they are occasionally not quite accurate in matters of detail. A few of the drawings of birds brought back by Bruce were described by Buffon and named by Gmelin, but the exact species have in some instances remained obscure.

In 1814 an additional instalment to our knowledge of the avi-fauna was furnished in the appendix to Salt's "Travels in Abyssinia," in which an enumeration of the birds collected was given, and a few of the new forms were described by Lord Stanley.

After a beginning had thus been made by English travellers, the field appears to have been abandoned by them, and the whole labour of collecting and describing the fauna of Abyssinia has, almost without exception, been performed by German and French travellers and naturalists. Foremost amongst these stands Rüppell, who made two long journeys in North-eastern Africa. The natural history results of his travels were published, principally in three works, to which frequent reference will be made in the following pages. These works are—

1. "Atlas zu der Reise in nordlichen Africa, zoölogischer Theil" (Atlas to the Journey in Northern Africa, Zoological Portion). 1826.

2. "Neue Wirbelthiere zu der Fauna von Abyssinien gehörig" (New Vertebrata belonging to the Abyssinian Fauna). 1835. From references made in the text of this work, it is evident that a portion was of later date than the title-page.

3. "Systematische Uebersicht der Vögel Nord-ost Africa's" (Systematic Review of the Birds of North-eastern Africa). 1845. This is a complete list of all the birds at that time known to have been found in the Nile valley, Abyssinia, and the countries on the shores of the Red Sea. The number enumerated is 532.

A large number of alterations and additions have since been made to this list, but it contains a very large amount of valuable information. Several new species were described in each of the three works, those in the "Systematische Uebersicht" being all birds, admirably figured by Wolf; whilst in the two earlier works numerous kinds of mammals, reptiles, and fishes were described and figured. A few invertebrata are also included in the "Atlas."

Besides these three works, a few scattered papers have been contributed by Rüppell to the Journals of Societies, &c. Of these the most important appeared in the "Museum Senckenbergianum," a scientific work published at Frankfort (1834–37).

About 1828–30 appeared the "Symbolæ Physicæ" of Hemprich and Ehrenberg, a work of much research; but which, unfortunately, was given to the world in a very incomplete state. It contains elaborate inscriptions, in Latin, of several mammals, birds, and insects, collected by the writers on the shores of the Red Sea, where Professor Hemprich died, one of the many martyrs to science who have fallen in Africa. Some, both of the mammals and birds, had already been described in Rüppell's "Atlas." The "Symbolæ Physicæ" is a very rare work, and many of the species of birds described, only a few of which are figured, have been overlooked by subsequent writers.

Reference has already been made at the commencement of the geological part of this work to the labours of Messrs. Ferret and Galinier. The same officers made large botanical and zoological collections, descriptions of which were published in the third volume of their Travels in 1847. The animals were identified by MM. Guerin Meneville and De la Fresnaye, and descriptions of some new species of birds were published by the former in the *Revue et Magasin de Zoologie* for 1843, pp. 161, 162. These were figured in the atlas which accompanied MM. Ferret and Galinier's work.

The collections of Messrs. Dillon and Petit, attached to Lefebvre's exploring expedition, both of whom, unfortunately, lost their lives in Abyssinia, were examined and determined by MM. Desmurs, F. Prevost, Guichenol, and Guerin Meneville, and an account of them published in the sixth volume of Lefebvre's "Voyage en Abyssinie." The accompanying atlas contained figures of some of the animals supposed to be new to science. It is impossible to speak in high terms of this work, a large number of the names being inaccurate. The determinations also are too frequently based upon figures, always a source of error.

In 1863 Dr. A. Brehm of Berlin accompanied the Duke of Saxe Coburg in a shooting excursion from Massowa to the highlands of Mensa, east of the Anseba valley. The journey was too hurried for specimens to be collected, but Dr. Brehm's previous extensive knowledge of the North African fauna enabled him to identify, for the most part correctly, thirty-eight species of mammals, and one hundred and seventy-two species of birds, observed during his visit, and to publish, in 1863, in a work called "Reise nach Habesch"[1] (A Journey to Abyssinia), a somewhat elaborate account of the habits of the majority. In a few instances the descriptions given are based upon observations too hurriedly made to be quite trustworthy; and it is probable that in some cases Dr. Brehm did not identify the animals observed correctly, an error which want of specimens prevented him from remedying subsequently.

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[1] This name is ill chosen, because Dr. Brehm did not enter Abyssinia Proper. Mensa, like Bogos, is a dependency of Tigré, inhabited by a race of people distinct from the Abyssinians.

I have left to the last all notice of by far the largest and most important contributions to our knowledge of the Abyssinian fauna which have appeared since Rüppell's time; those of Hofrath Th. von Heuglin, for many years a resident in the Nile valley, and who has recently explored a large portion of the Abyssinian highlands. His first important paper—a second "Systematische Uebersicht," or Systematic Catalogue of the North-east African Avi-fauna—appeared in the *Journal der zoologischen botanischen Gesellschaft zu Wien*[1] for 1856, pp. 255 to 354. In this list 754 species of birds are enumerated as occurring in North-eastern Africa. I cannot help thinking, however, that the publication of this paper is to be regretted. For the writer there is some excuse, as the list was doubtless drawn up without sufficient means of reference, but the Society which allowed it to appear in its Journal deserves the reprobation of every naturalist who does not wish ornithological nomenclature to become a mass of confusion. Every mistake of Rüppell's was repeated, and a very large number of species were named as new without descriptions being furnished. The majority of these supposed species have since been found, by the author himself, to have been proposed in error. Many were only varieties, others had already been described, and so little value is attached to the names proposed by Von Heuglin that, when furnishing descriptions of some of the species several years later, he has himself changed a great proportion of those given by him in his former essay. In the following pages I shall refer to this paper as little as possible.

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[1] *Journal of the Zoological and Botanical Society of Vienna.*

Short notices by Von Heuglin, with occasional descriptions of species both of birds and mammals, are scattered through Cabanis' " Journal für Ornithologie," the " Ibis," the " Nova Acta Academiæ Leopoldo-Carolinæ," and " Petermann's Mittheilungen," during the last ten years. And recently (1867–69) some most valuable and exhaustive descriptions of all the species belonging to several families of Insessorial Birds inhabiting North-eastern Africa by the same naturalist have appeared in the " Journal für Ornithologie," and a synopsis of the *Malurinæ* in the " Ibis " for 1869. During the course of this year also the same writer has published the first eight parts of an elaborate work on the birds of North-eastern Africa, called " Ornithologie Nord-ost Africa's." To all of these later papers, and to the more extensive work just mentioned, I have supplied references in the following pages. I cannot in all cases coincide in Von Heuglin's nomenclature. His descriptions, however, are excellent, and detailed, and numerous references are given to the works of previous writers.

In the subsequent pages only the vertebrata of my Abyssinian collections have been fully enumerated and properly worked out. Despite much time and labour, the synonomy is far from being so thorough as I could have wished, but only those who have entered into such questions know the amount of time which must be given to each species before its synonomy can be accurately determined. For the determinations of many species of birds I am indebted to the aid of Messrs. Jules Verreaux, G. R. Gray, Lord Walden, Messrs. Gurney, Tristram, Harting, R. B. Sharpe, Cabanis, and especially to Dr. Finsch, to whose MS. list and notes[1] of the birds collected by my friend Mr. Jesse I have had access through the kindness of Dr. Sclater. For the identification of the reptiles and of the two species of fish brought back by me, my thanks are due to Dr. Günther. For aid and information in determining the mollusca, I am under obligations to Messrs. G. Nevill, Hanley, and H. Adams.

I much regret that I am unable at present to furnish a detailed list of the invertebrata collected, and that of the mollusca at least, to which I have devoted much time, I cannot give as full an account as of the vertebrata. But the leave which has been most liberally granted to me by the Government of India for the purpose of preparing this work, together with an extension sanctioned by the Secretary of State for India, being at an end, I find that the time has not sufficed for that study of the very extensive and confused literature of the subject which alone would enable me to do it justice. I have consequently been compelled to limit myself to the appended list.

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[1] This list will appear in the *Transactions* of the Zoological Society of London.

The physical geography of Abyssinia has already been briefly described in the commencement of the geological portion of this work. It is only necessary to refer to it here in order to point out that a large portion of the country consists of plateaux 7,000 to 10,000 feet above the sea, and that from amongst these a few peaks and ranges rise to 12,000 and even 15,000 feet, whilst many of the valleys, even where they intersect lofty plateaux, are cut to so great a depth that at the bottom they do not exceed 4,000 or 5,000 feet above the sea. As may be readily supposed, there is a great difference in the animals and plants inhabiting these different elevations, and the distinction has attracted far less attention amongst naturalists than it deserves.

My own observations were naturally imperfect. It not unfrequently happens that an animal, which from peculiarities of soil and climate is constant to one elevation in one region, ranges higher or lower in others; and this I found to be the case in several instances. Had my explorations extended over a larger portion of Abyssinia, I might doubtless have corrected my first impressions in a still larger number of instances. Von Heuglin in his later papers generally gives the range in elevation of each species, and in many cases his observations show that range to be greater than appeared to me to be the case in the much more limited area which fell under my examination.

Nevertheless, I think that the animals inhabiting Abyssinia may very fairly be classed according to the elevations at which they occur. I am disposed to divide the country hypsometrically into four regions, thus:—

1. Subalpine region, above 9,000 feet.[1]
2. Temperate region, about 6,000 to 9,000 feet.
3. Subtropical, about 3,000 to 6,000 feet.
4. Tropical, below 3,000 feet.

The altitudes are merely approximate, and vary somewhat in different localities. Some animals range throughout several regions: thus the Hamadryas monkey, spotted hyæna, wart-hog, and elephant amongst mammals, and *Neophron percnopterus*, the Lämmergeyer, the Common Kite, *Aquila rapax*, *Bucorvus abyssinicus*, *Pycnonotus arsinoë*, *Corvus scapulatus*, *Buphaga erythrorhyncha*, *Numida ptilorhyncha*, and many migratory birds, are all found throughout the three lower regions, and some of them even in the subalpine zone. Some animals migrate with the season, ascending to the highlands during the summer and returning to the lower elevations in winter. Others, such as *Laniarius æthiopicus*, *Coracias abyssinica*, *Corvus affinis*, *Lamprocolius chalybæus*, though usually confined to the subtropical and temperate regions, are occasionally seen in considerable numbers near the coast.

The majority, both of the mammals and of the birds, range into more than one of the regions indicated, but still in passing from one to the other a very great and marked change takes place, and the great majority of the common birds are completely replaced by other species. I think, too, that the prominent birds and mammals in each region appertain to distinct sub-faunas at least. This will be best shown by a few brief remarks upon the prominent animals in each region.

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[1] There may possibly be a still higher or Alpine region on the summits of the Samyen mountains, close to the limits of perpetual snow. On a few of the very highest peaks the snow is said never to disappear entirely.

1. *The Subalpine Region.*—I had only an opportunity of examining this on the Dalanta-Wadela plateau, and in two or three of the passes traversed. My collections were consequently very small. The only peculiar mammals obtained were a *Hyrax* and a mouse (*Mus abyssinicus*, Rüpp.), and the following birds:—

Pratincola sordida.
Saxicola frenata.
Macronyx flavicollis.
Pyrrhocorax alpinus.
Euplectes xanthomelas. } Found locally as low as 8,000 feet.
Crithagra nigriceps.
Lobivanellus melanocephalus.
Bernicla cyanoptera.

The following were so abundant at 10,000 to 10,500 feet as to be characteristic birds, but they were also found generally throughout a great portion of the temperate region:—

Buteo augur.
Nectarinia takazze.
Corvultur crassirostris.
Chettusia melanoptera.
Ibis (Harpiprion) carunculata.
Anas flavirostris.

The only species in the above list not peculiar to Abyssinia are the Alpine chough and *Anas flavirostris:* the first of which is European; the other, which is not peculiar to the subalpine fauna, is also found in South Africa.

2. *The Temperate Region.*—This comprises the great plateaux at 7,000 and 8,000 feet, and furnishes the typical fauna of Abyssinia. The following mammals and birds appeared to be amongst those most characteristic :—

MAMMALS.

Canis variegatus.[1]
Antilope (Cephalophus) madoqua.
Antilope (Scopophorus) montanus.
Lepus tigrensis.
Xerus leucoumbrinus.
Bathyergus splendens.

BIRDS.

Nisus tachiro (Accipiter unduliventer, Rüpp.).
Bubo cinerascens.
Turacus leucotis. } Both found as low as 4,500 feet.
Colius leucotis. }
Psittacula tarantæ.
Pogonorhynchus undatus.
Centropus monachus.
Cypselus æquatorialis.
Corythornis cristata (v. *cyanostigma*).
Tockus Hemprichii. }
Nectarinia cruentata. } Found as low as 4,500 feet.
Lanius humeralis. }
L. erythropterus. Found at 4,000 feet.
Bradyornis chocolatina.
Oriolus moloxita.
Turdus simensis.
T. olivacinus.
Cossypha semirufa. Found from 4,000 to 9,000 feet.
Thamnobia melæna.
Saxicola lugens.

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[1] Most of the mammals ranged to lower elevations. Those mentioned appeared to descend less than the others

Graminicola Levaillantii.
Cisticola abyssinica.
Parus dorsatus.
Amydrus albirostris.
A. Rüppelli. Found rarely at lower elevations.
Hyphantornis larvata.
H. Guerini.
Coliuspasser laticauda.
Fringilla tristriata.
Crithagra striolata.
Columba albitorques.
Turtur lugens.
Pterocles gutturalis.
Francolinus Erkelii. Ranges from 3,000 to 10,000 feet.
F. gutturalis. Ranges into the subtropical region.
Otis melanogaster.
Rallus Rougetii.

Of the above list, whilst a considerable majority are peculiar to the Abyssinian highlands, several are also common to Southern Africa. Such are *Nisus tachiro, Bubo cinerascens, Corythornis cristata, Graminicola Levaillantii,* and *Pterocles gutturalis.*

3. *The Subtropical Fauna.*—This I met with in the pass leading to Senafé, and again in the Anseba valley. The following animals appeared to be the most characteristic :—

Mammals.

Cercopithecus griseo-viridis. Ranges into the temperate region also.
Canis mesomelas.
Sciurus annulatus.

Birds.

Bubo lacteus.
Athene perlata.
Chizaerhis zonura. Found also, but rarely, in the temperate region.
Colius macrourus.
Pionus Meyeri.

Picus æthiopicus.
Indicator Sparmanni.
Pogonorhynchus abyssinicus. Ranges into the temperate region.
Barbatula pusilla.
Oxylophus afer.
Coracias pilosa. Occasionally seen in the temperate region.
Eurystomus afer.
Ispidina picta.
Halcyon senegalensis.
Merops erythropterus.
M. Lafresnayii. Also in temperate region.
Tockus flavirostris. In temperate region in summer.
T. erythrorhynchus. Also occasionally in tropical region.
Irrisor aterrimus.
Nectarinia affinis. Ranges into the temperate region.
N. pulchella.
Laniarius gambensis.
Dicrurus divaricatus.
Grandala (or *Pholidauges*) *leucogaster.* Absent in winter.
Oligocercus micrurus.
Cameroptera brevicaudata.
Parus leucopterus.
Lamprotornis purpuroptera.
Hyphantornis luteola.
Vidua principalis.
Emberiza flaviventris.
Treron abyssinica. }
Francolinus Rüppelli. } Extend into the temperate region.

A great distinction will immediately be noticed in this list. Instead of the majority being peculiar to Abyssinia, at least two-thirds range over a large part of Africa, being known either from Senegal or the Cape. The species also are, if anything, less restricted in range than those found in the other regions.

4. *The Tropical Region.*—This I only examined near the coast. It has a well-marked and peculiar fauna, consisting in a great measure of *desert* species, but for the presence of which, indeed, it could scarcely be

separated from the last. The following are characteristic :—

MAMMALS.

Felis maniculata.
Canis riparius.
Gazella Sœmmeringi.
G. dorcas.
Oryx beisa.
Lepus ægyptius.
Xerus rutilus.
Dipus gerbillus Olio.

BIRDS.

Melierax polyzonus.
Picus Hemprichii.
Pogonorhynchus melanocephalus.
Cypselus affinis.
Merops viridissimus.
M. albicollis.
Tockus nasutus. Ranging into subtropical region.
Nectarinia habessinica. Ranging into subtropical region.
N. metallica. Absent in winter.
Lanius fallax.
L. isabellinus.
L. personatus.
Laniarius cruentatus.
Cercotrichas erythropterus.
Saxicola deserti.
Cercomela melanura.
Drymœca rufifrons.
D. gracilis.
Aëdon galactodes.
Pyrrhulauda melanauchen.
P. albifrons.
P. leucotis.
Galerita cristata.
Ammomanes deserti.
Certhilauda desertorum.
Estrelda rhodopyga.
Turtur albiventris.
Pterocles exustus.
Pt. Lichtensteini.
Pternistes rubricollis.
Otis arabs.
Œgialitis tricollaris.
Sarciophorus tectus.

—together with the species of gulls, terns, and many waders peculiar to the shores of the Red Sea. Amongst the reptiles are species of *Lacerta* and *Acanthodactylus* and *Echis carinata.*

This fauna is far less typically Abyssinian than any of the others; it contains but few species which have not an extensive range in Northern Africa, Arabia, and Persia, some being even found in India.

Amongst the most striking instances of species on the highlands of Abyssinia representing those in the lower country are the following. The range, so far as observed, is noted in each instance.

LOWLAND FORMS.	ft.		ft.	REPRESENTATIVES ON HIGHLANDS.	ft.		ft.
Picus Hemprichii	1,000	to	4,000	*P. æthiopicus*	3,000	to	6,000
Colius macrourus	3,000	„	6,000	*C. leucotis*	4,000	„	8,000
Pogonorhynchus melanocephalus	500	„	3,000	*P. abyssinicus* *P. undatus*	4,000 7,000	„ „	7,000 8,000
Centropus superciliosus	1,000	„	5,000	*C. monachus*	6,000	„	8,000
Tockus erythrorhynchus	1,000	„	5,000	*T. flavirostris*	3,000	„	8,000
Nectarinia habessinica	—		5,000	*N. affinis*	4,000	„	7,000
N. metallica	—		2,000	*N. pulchella*	4,000	„	5,000
Saxicola deserti	—		1,000	*S. lugens*	6,000	„	8,000
S. isabellina	—		8,000	*S. frenata*	above 10,000		
Parus leucopterus	4,000	„	7,000	*P. dorsatus*	7,000	to	9,000
Crateropus leucocephalus	500	„	4,500	*C. leucopygius*	4,000	„	8,000
Hyphantornis galbula	—	„	5,000	*H. Guerini*	7,000	„	9,000
Turtur semitorquatus	1,000	„	7,000	*T. lugens*	6,000	„	9,000
Lobivanellus senegalensis	4,000	„	8,000	*L. melanocephalus*	above 10,000		

It should be remembered that the above range is frequently exceeded in parts of the country not visited. I scarcely think, however, that this is anywhere the case to a sufficient extent to vitiate the representation.

CLASS MAMMALIA.

ORDER *QUADRUMANA.*

1. Cynocephalus hamadryas, L.

Hemp. and Ehr. Symb. Phys. t. 11.
Rüpp. Neu. Wirb. p. 7.—Brehm, Habesch, No. 2.

The great Dog-faced Baboon, the Sacred Ape (Thoth) of the ancient Egyptians, is by far the commonest Monkey throughout the portion of Abyssinia traversed by me. It was met with everywhere from the plains around Annesley Bay to the top of the Dalanta plateau, although most abundant, perhaps, in the tropical and subtropical portions of the country. I saw a small herd close to Theodore's old camp at Baba, on the Dalanta plateau, at above 9,000 feet of elevation. In the passes leading to the table-land from the coast immense numbers were constantly seen, and the animals evidently keep much to the sides of rocky ravines.

The herds vary in number; some cannot include much less than 250 to 300 Monkeys of all ages. The old males are always most conspicuous animals, all the forepart of their body being covered with long hair. They usually take the lead when the troop is moving; some of them also bringing up the rear; others placing themselves on high rocks or bushes, and keeping a sharp look-out after enemies. A troop collected on a rocky crag presents a most singular appearance. I several times saw large numbers assembled around springs in the evening in the thirsty Shoho country between Komayli and Senafé. On such occasions every jutting rock, every little stone more prominent than the rest, was occupied by a patriarch of the herd, who sat, with the gravity and watchfulness befitting his grizzled hair, waiting patiently until the last of his human rivals had slaked his thirst and that of his cattle. Around, the females were mainly occupied in taking care of the young, the smaller Monkeys amusing themselves by gambolling about. Occasionally, if a young Monkey became too noisy or interfered with the repose of one of his seniors, he "caught it" in most unmistakeable style and was dismissed, with many cuffs, a wiser if not a better Monkey.

Cynocephalus hamadryas feeds on small fruits, berries, and seeds, and often on buds of trees, and on young shoots. On the highlands I frequently saw troops of them in the fields, engaged in searching for the "quentee," the small tubers of *Cyperus esculentus*, which appeared also to be a great resource of the half-starved people in Tigré.

This species is very rarely seen on trees. It appears to avoid woods, and to keep mainly in the open country, preferring, as already mentioned, rocky precipices. Hence its habits differ entirely from those of all the Indian Monkeys, which are tree-loving animals, and indeed from Monkeys in general. It climbs heavily and clumsily for a Monkey, and when moving quickly on the ground has a steady, regular gallop instead of the bounding movements of a

Presbytes. Doubtless the association in such very large herds is in a great measure adopted as a means of defence against its enemies. From their size and great power of jaw the old males are most formidable antagonists, and their boldness in resenting injury is said to be in proportion to their power. Brehm ("Reise nach Habesch," p. 88) relates an instance which came under his own notice of their attacking a Leopard which had carried off one of the herd, and many stories are current in Abyssinia of their attacking men. Mr. Münzinger told me that once he, with one or two companions, were surrounded by a large herd, which barred their path, and were so threatening that he was obliged to shoot one in self-defence. Even then, although they fell back a little, the Monkeys did not run away.

I cannot help thinking, however, that these Monkeys very rarely attack men, as otherwise some instances would have happened in the expeditionary force, and I never heard of any. Near the passes the flocks of *Cynocephalus* soon became wary, as they were frequently fired at. Young animals, when captured, quickly became tame and docile, but not so much so as the *Cercopithecus.*

2. Cercopithecus griseo-viridis, Desm.

Desmarest, Mammalogie, p. 61.—Brehm. Habesch No. 1.

I met with this monkey but rarely. Unlike the *Cynocephalus,* it is a true tree-monkey, and very rarely seen except in forest. On the highlands I only once saw a flock—this was near Dildi, south of Lake Ashangi. I met with larger numbers on the Anseba, where they inhabited the high trees on the banks of the stream. The flocks seen were small, not exceeding twenty to thirty individuals. I had but few opportunities of observing their habits, but they appeared to differ but little from those of *Macacus* or *Inuus*, except that *Cercopithecus* is a quieter animal and less mischievous. In captivity they are well known as excessively docile and good-tempered, and fairly intelligent.[1]

The following are the dimensions of a full-grown female taken from a freshly-killed specimen. The males are larger.[2]

	ft.	in.
Length from upper lip to brow	0	1¾
„ „ brow to nape over the head	0	3¾
„ „ nape to rump	1	1½
„ of the tail, 20½ in.; hair beyond end, 1½ in. . .	1	10
„ from shoulder to elbow	0	4½
„ „ elbow to wrist	0	4½

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[1] It is the commonest of mistakes amongst superficial observers, and even amongst naturalists, to confound docility and intelligence in animals, and to measure their intellectual powers by the facility with which they can be taught. Hence the very common but, as it appears to me, very incorrect notion, that monkeys are of inferior intelligence to such animals as dogs or elephants. In reality they are less docile, less willing to learn, and less adapted to captivity; moreover, being of but little use to man, far less trouble has been taken in studying their habits. Thus, while dog- and elephant-breaking engage all the time and mental resources of particular classes of men, the instruction of monkeys is left to the unaided efforts of amateurs and organ-grinders. The negro race amongst men appears to be far better adapted for slavery than most savage races, being more *docile* in a state of captivity; but it is scarcely proved to be more *intelligent* on that account. The same reasoning will doubtless apply to animals. I have often seen dogs and monkeys kept together, and in every instance it has appeared to me that the monkey ruled the dog, and that the dog feared the monkey, although the canine was the more powerful animal; and I can only account for this by the superior intelligence of the monkey.

All measurements are in English feet and inches.

	ft.	in.
Length of hand	0	3
„ from hip to knee	0	5
„ „ knee to heel	0	5
„ of hind foot	0	4½
Height of ear	0	1⅜
Breadth of ear	0	1⅜

Cynocephalus hamadryas and *Cercopithecus griseoviridis* were the only two monkeys of which specimens were obtained. I saw a third species, perhaps *Theropithecus obscurus,* Heugl., at Magdala. The beautiful *Colobus guereza,* of which skins are frequently brought to Aden from the mountains of the Somali country, I never heard of while in Abyssinia.

ORDER *CHEIROPTERA.*

3. **Vespertilio,** sp.

Bats were remarkably scarce throughout the Abyssinian highlands, partly perhaps owing to the season of the year, and I only obtained one specimen, which is in too poor condition for determination.

ORDER *CARNIVORA.*

4. **Felis maniculata,** Rüpp.

Rüppell, Atlas, t. 19.
F. caligata, partim, Gray, Cat. Carn. &c. Mamm. in Brit. Mus. 1869, p. 29.

I obtained a single specimen of this cat at Zoulla. Its colour is pale rufous grey, more rufous and rather darker in the centre of the back, with indistinct spots on the flanks. Ears rather deeper rufous, the hairs at the extremity very slightly lengthened. Legs with more distinct but rather irregular transverse stripes, which become darker below: one just below the elbow on the fore leg is black, and particularly distinct on the inside. Soles of feet black. Tail ringed towards the tip, the last ring, and the tip for about 1½ inch, black: altogether three rings are distinguishable besides the tip, each one less distinct than that behind it and at a greater distance from the last. Hairs of the back when examined singly are rufescent grey with a black tip, the latter frequently wanting on the flanks. Head about 3 inches long, from between ears to insertion of tail about 18 inches, tail 12 inches. The measurements, being taken on the dried skin, are not quite accurate, with the exception of the tail, although very nearly so. None of the hairs on the back much exceed 1¼ inches in length.

Although the "Monographies" of Temminck are dated 1827 on the title-page, and the Atlas to Rüppell's "Reise" 1826, the former unquestionably appeared the first, as in the latter, in the description of *F. maniculata,* reference is made to the page in Temminck in which it is mentioned as a new species found by Rüppell. If therefore, as Dr. Gray considers, *F. maniculata* is identical with Temminck's *F. caligata,* he is quite correct in upholding the latter name. It should, however, be borne in mind that the two are mentioned by Temminck as distinct, and I am disposed to consider Temminck's animal to be the following species.

5. F. caligata, Temm.

Booted Lynx of Bruce, Travels, vol. v. p. 146, with plate.
***F. caligata*, Temm. Monographies de Mammalogie, i. p. 123.**

It is extremely difficult to ascertain the correct specific names for cats. Dr. Gray may perhaps be right in uniting all these African forms. In this case as in hundreds of others, if a large series be examined, it will be found that there is a gradation between the extreme forms, and yet the Gordian knot is only cut by classing all together. In the present instance, the single specimen of a wild cat which I obtained from the highlands of Abyssinia is so entirely different from the specimen last described, that no naturalist looking at these two only would consider them to belong to the same species. The specimen which I assign to *F. caligata* was shot at Adigrat at an elevation of about 8,000 feet above the sea. It is at least twice the size of the specimen of *F. maniculata;* the measurements, again unfortunately only taken from the dried skin (which, however, is in beautiful order and in no way distorted), being—

	ft.	in.
Head and body to insertion of tail	2	1
Tail	1	1
Total	3	2

The head is about 4 inches long, ears 2 in. long, radius 5½ in., carpal joint to end of toe 3 in., tibia 5½ in., tarsus and hind toes 5½ in. The general colour is a somewhat rufous grey, darker from being mixed with black towards the centre of the back. The hair of the fur is fulvous, becoming paler on the flanks, dusky at the root, grey towards the tip, with a short dusky ring between the isabelline and grey, and more or less of a black tip, especially towards the centre of the back. The hairs on the back are about 2½ inches long. Under parts rufous white. The tip of the tail for about 2 inches is black: there is a black ring about an inch further forward, and indications of a second. The cheek and face-markings are very faint. Ears rufous brown, scarcely pencilled at the end. There is a faint black ring round the shoulder, much more strongly marked inside, as usual. The soles of all the feet are black.

This cat agrees exactly both in the character of the fur and in coloration with Cape specimens, and there are skins both in the British Museum and in that of Berlin which are precisely similar. This is an important point, because in this instance, as in others, the animal from the lowlands of Abyssinia is a tropical form and similar to others found in the neighbouring tropical countries, whilst that from the highlands is a form found again in a distant part of Africa, where the climate is cooler. This fact is of more interest than the question whether these various races shall be called species or varieties.

I have scarcely a doubt that this is the "Booted Lynx" of Bruce, and Temminck especially identifies Bruce's description with his *F. caligata.* In Bruce's figure the ears are much too large, and too strongly penicillated, as remarked by Temminck. Indeed this cat scarcely belongs to the lyncine group.

At Berlin I found this cat labelled *F. caffra,* Desm.: but it does not coincide with Desmarest's description.

6. Felis leo, L.

Although no specimens were brought away, a few words on the Abyssinian lion may not be out of place. The sportsmen of the army who went to Abyssinia with the expectation of shooting large game were greatly disappointed; on the route selected the paucity of large animals was remarkable. Not a single lion was shot by any officer of the expedition, and only one or two were seen. In my subsequent journey, however, to the Anseba, I met with several, as related above, and aided in killing one lioness. The incident has been related in a previous page, and is worthy of notice, as it illustrates the boldness of the lions.

On the Anseba lions abounded, and the valley resounded with their roaring every night. They were not often seen, for they usually appeared to pass the day in the dense thickets on the river-banks, or in the neighbouring ravines, and they were often heard roaring in these thickets towards evening. In one instance Captain Mockler and I listened to one for some time, nearly an hour before sunset. It was useless for us to attempt to shoot him in the thicket in which he then was. The Bedjuk people who were with us assured us they could bring him out into the open. These people firmly believe that the lion understands them when they speak to him, and that if they abuse him sufficiently to make him angry he will come out to attack them. The plan for this novel lion-hunt therefore was that all should stand outside the thicket, and that the Bedjuk should call him names. I regret to say that the experiment was unsuccessful, the whole vocabulary of Tigréan Billingsgate failed in arousing the wrath of his majesty sufficiently to induce him to make his appearance; and as night came on, and we retreated homewards, he roared more loudly than ever in the depths of his thicket. Like all true believers, our Bedjuk friends were by no means shaken in their faith or inclined to doubt that the lion had understood their abuse; in fact, their opinion of his intelligence was increased by the circumstance that he would not venture out while there were guns in the way; and they assured us that had they been alone he would have attacked them for daring to abuse him.

Lions kill many cattle, mules, donkeys, and horses in the Habale and Samhar, and are said to migrate with the herds, following them to the lowlands in the winter, and ascending with them to the mountains in summer. Men are often killed by them: we heard of several instances taking place during our short stay.

Having had many opportunities of observing the Indian tiger, I may make a few remarks on the differences between the habits of the two great carnivores.

The first peculiarity that struck me in the African lion was their noisiness. I have constantly been for months together in countries in India abounding in tigers without hearing their cry. Indeed, it is by no means a common sound in an Indian forest; leopards, I should say, are much more frequently heard than tigers. The cry of the two animals, commonly known as roaring, though it is utterly different from the harsh growl of anger to which the term might most appropriately be applied, is very similar, and consists of several deep notes uttered rather quickly one after the other, and repeated at longer or shorter intervals. I never heard tigers until it was nearly dark. As already mentioned, lions were sometimes very noisy before dusk.

Another characteristic of lions is their greater boldness. The attack upon our camels in open day, near Ain, and the circumstance of a lioness lying in bushes within 200 yards of our camp, in spite of shots fired at her, at Ailat, are instances. I have known of similar cases with tigers, but they are very unusual.

Both animals resemble each other in their wandering habits, and in their preference for sandy roads or river-beds for their nocturnal rambles, the feet in both being too tender to stand much walking over sharp stones. The largest tracks of lions seen by us were, as nearly as I could tell, about equal in size to those of the largest tigers.

I only saw one cow which had been killed by a lion, and in this instance the neck was not broken, as it almost invariably is in large animals killed by tigers.

The Abyssinian lion has only a short mane like that of Senegal, and is consequently considered by some naturalists as a distinct race from the heavily-maned Cape and Barbary lions. The Persian lion, figured in the *Revue et Magasin de Zoologie* for 1862, shows the same peculiarity. The Indian lion has now been clearly proved to have a long mane when adult; the maneless animals, on which the variety *Felis leo goojeratensis* was founded, having been shown to be young animals.

This irregular geographical distribution of the two varieties is opposed to the idea of their being really distinct forms.

The following dimensions of the lioness killed by Captain Mockler, near Ain, were taken on the carcase about an hour after death, and before skinning. The lions seen by us were larger animals, but this appeared to be a full-sized female.

	ft.	in.
Length of face, from the nose to between the ears	1	1
„ from between ears to top of shoulder	1	3
„ of back from the top of the shoulder to the insertion of the tail	3	1
„ of tail, including the hairs at the end	2	7
Total length from nose to end of tail, measured along the curve of the back[1]	8	0
Length of the body measured in a direct line along the side from the front of the shoulder to the rump	3	5
Height at shoulder	2	8
Depth of body behind shoulders	1	3½
Length of the ear	0	4
Girth of chest behind shoulders	3	3
„ neck	1	9
„ head in front of the ears	2	1
„ forearm	1	1

7. **Genetta tigrina,** Schreber.

Viverra tigrina, Schreb. Säugth. III. p. 425, t. 115.
G. abyssinica, Rüpp. Neu. Wirb. p. 33, t. 11.
G. tigrina, Gray, Cat. Carn. &c. Mamm. Brit. Mus., 1869, p. 51.

I am indebted to Lieut. St. John, who had charge of the telegraph in Abyssinia, for a skin of a civetcat, shot near Annesley Bay I believe, which I can only refer to this species. If Dr. Gray is correct in uniting the various races from different parts of Africa under *G. tigrina,* I think there can be but little doubt but that the present specimen must also belong to the same. It differs materially from Rüppell's figure of *G. abyssinica,* there being, including the tip, only ten black rings on the tail instead of eighteen.

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[1] This is the usual sportsman's plan of measuring wild animals, and is less liable to inaccuracy than measuring in a straight line. The skin, when taken off and stretched, always measures one-eighth to one-quarter more.

There is an Abyssinian specimen in the British Museum labelled *G. amer.* Rüpp.,[1] which is considered by Dr. Gray to be a variety of *G. tigrina.* It differs from my specimen in being of a darker colour, and in the bands on the flanks not being broken into spots. A young specimen in the British Museum labelled *G. abyssinica,* from Sennaar, has nine tail-rings. The markings are very similar to those in my specimen.

8. **Herpestes mutgigella,** Rüpp.

Rüpp. Neu. Wirb. p. 29, t. 9, f. 1.

To this species I refer all the specimens, seven in number, collected by me in Abyssinia. All were obtained from Senafé or Adigrat, except one specimen from Suru. They vary much in colour, some being very much more rufous than others. Usually the hinder part of the back is more or less rufescent. Some are deep rufous brown along the whole back and on the back of the head; all have the tail tipped with black. The greyest specimen of all is that from the Suru pass, shot at an elevation of only 2,000 feet above the sea, and I at first thought this might be *H. gracilis*, Rüpp.; but it has the black tail-tip of *H. mutgigella*. I have seen a precisely similar specimen in the Berlin Museum, labelled *H. gracilis*, and I much doubt if the two forms are really distinguishable. The tail varies in length in different specimens from twelve to fifteen inches.

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[1] Evidently a MS. name merely.

This ichneumon was usually seen in low bush jungle; often upon rocks. It is diurnal in its habits. I also once or twice saw a striped species, probably *H. zebra*, Rüpp., of which I did not succeed in securing specimens.

9. **Hyæna crocuta, L.**

H. crocuta et *H. maculata*, auct.
Crocuta maculata, Gray.

From the time of entering Abyssinia to that of leaving it, the singularly unearthly howl of the spotted hyæna was the commonest of nocturnal sounds. Yet it was the rarest occurrence to see one of these animals in the day. I only turned up two or three from ravines and thickets, and occasionally caught sight of one prowling about towards dusk. At night the hyænas constantly came amongst the tents, and sometimes attacked goats, mules, ponies, or cattle, which were tethered near the camp. They were just as abundant on the highlands as in the low country.

In boldness and rapacity the spotted hyæna is far superior to his striped relative, so far at least as can be judged from the habits of the latter in India. I have never known *Hyæna striata* to kill any animal larger than a goat, and it is mainly a carrion-feeder. In the Abyssinian campaign I met with several instances of both cattle and mules being attacked by spotted hyænas. A full-grown cow just outside our camp at Ailat was torn to pieces and entirely devoured by hyænas before morning. These animals evidently collect in considerable numbers. In India it is a common practice amongst sportsmen to tie up young buffaloes or bullocks as baits for tigers, in places haunted by those animals. In hundreds of instances in which I have known this done, I never remember one of the baits being killed by hyænas, although, after a bullock or buffalo is killed by a tiger or leopard, hyænas almost always feed on the carcase.

The striped hyæna is a noisy animal at night, but far less so than *H. crocuta,* and there is a considerable difference in the voice.

Striped hyænas are said to be sometimes seen in parts of Abyssinia, and I heard from Mr. Münzinger that a third smaller animal occurs near Massowa, which is much dreaded by the natives, as considerable numbers of them collect and attack men. This may be *Lycaon picta,* and not a hyæna.

In gait *Hyæna crocuta* is much less ungainly than *H. striata,* the disproportion in the length of the legs being much smaller.[1]

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[1] In the Catalogue of Carnivorous, &c. Mammalia in the British Museum, 1869, *Hyæna* as restricted is said to have the legs subequal, and *Crocuta* to have the hinder legs short. These characters should be reversed.

The following are the dimensions of a fine male killed at Takonda, near the head of the Haddas pass :—

	ft.	in.
Length of head from nose to nape	0	11
„ neck and body from nape to rump, measured along the curve of the back	3	1
„ tail, 1 ft.; hairs beyond end, 6 in.	1	6
Total length from nose to end of tail, measured along the curve of the back	5	6
Height at shoulder	2	6
Length of body from shoulder to rump, measured along the side	2	5
Girth of neck	1	10
„ chest behind shoulders	2	11
„ forearm	0	9½

10. Canis mesomelas, Gm.

Syst. Nat. I. pt. 1, p. 73.—Rüpp. Neu. Wirb. p. 39.

This very handsome jackal was occasionally seen in the pass between Komayli and Senafé, and much more frequently about the base of the hills west of Massowa, and on the Anseba. I believe that I met with it also in the desert country north-west of Massowa. On the shores of Annesley Bay it was never observed.

The following dimensions are those of a male animal killed in the Anseba valley :—

	ft.	in.
Length from nose to between ears	0	6½
„ „ between ears to top of shoulder	0	5½
„ „ top of shoulder to rump	1	2
„ of tail, 1 ft. 2 in.; hairs beyond end, 2 in.	1	4
Total length from nose to tip of tail measured along the curve of the back	3	6

	ft.	in.
Length of body from shoulder to rump, measured along the side	1	8
Height at shoulder	1	6
Girth of neck	0	10
„ body behind shoulder	1	3½

On one occasion, at least, animals of this species were seen in the immediate vicinity of a lion. In fact, it was their peculiar movements, walking slowly away with constant glances towards a particular bush, that drew our attention to the place where the lion lay.

11. **C. variegatus**, Rüpp.

Rüpp. Atlas, t. 10.—Neu. Wirb. p. 39.

This is the common jackal of the Abyssinian highlands. It may also occur at low elevations, but of this I am not certain. By Rüppell and Brehm it is considered merely a variety of the last species ; but in this view I cannot concur, as amongst the numerous jackals seen by me on the highlands I never recognised a specimen of *C. mesomelas,* which I never met with above about 5,000 feet. I also think the present a larger animal. The measurements given below only convey a very faint idea of the proportionally greater weight and bulk ; in the dried skins the limbs of *C. variegatus* are very much larger than those of *C. mesomelas.*

I must express my surprise at finding these African jackals—for they are true jackals—classed in Dr. Gray's list with foxes, whilst the Indian jackal, *Canis aureus,* is placed with the wolves (P. Z. S. 1868, pp. 504, 516, and Cat. Carn. &c. Mamm. Brit. Mus. 1869, pp. 188, 203). If the genus *Canis* is to be subdivided to the extent which is done by Dr. Gray, the jackals (*Saccalius*) are a much more natural group than some of those adopted, and in all their habits differ greatly from foxes. They are far more social, and are eminently scavengers, feeding upon carrion, and haunting the neighbourhoods of towns and villages. Their cry is peculiar and prolonged, never a sharp bark like that of a fox. Their build is quite different; the tail and ears are shorter, the legs longer, the muzzle blunter, and the jaws and teeth much more powerful. They never use burrows in the earth, except when they have young. I unfortunately omitted to notice the form of the pupil in *C. mesomelas* and *C. variegatus:* it is doubtless round, as in *C. aureus*.

Some specimens of *C. variegatus* resemble some of *C. aureus* so closely, that I doubt if the two forms could be distinguished by their skins. The former is a larger animal, however, and there is an important difference in the cry. That of *C. aureus* begins with a long shrill howl, repeated, with a slight rise in the scale at the commencement, three or four times, and followed by a modulated series of short barks. It is best conveyed by the well-known version, "Dead Hindoo-oo-oo, where, where, where?" both the first and second part being repeated separately. Now, in the cry of the Abyssinian jackal, the second portion, expressed by "where, where, where," is entirely omitted, and only the long wailing howl, a shrill representation of the noise made by a dog when "baying the moon," is uttered.

The following are the dimensions of two very fine Abyssinian jackals, male and female, shot, the first close to Senafé, the second at Halai :—

	Male.		Female.	
	ft.	in.	ft.	in.
Length from nose to between ears	0	7¾	0	7½
„ „ between ears to rump	2	0	1	11
„ of tail, 10 in.; hairs beyond end, 3 in.	1	1	1	0½
Total length from nose to tip of tail, measured along the curve of the back	3	8¾	3	7
Length of body from shoulder to rump, measured along the side	1	8	—	
Height at shoulder	1	8½	1	6
Girth of neck	—		0	10
„ body behind shoulder	—		1	4½
Length of ear	—		0	5
Longest hairs in moustache	0	3¼	—	

The skull of the male above mentioned is 6·7 inches long, 3·4 wide at the zygomata, and 2·75 high measured through the front of the orbit.[1]

About Annesley Bay there was a small kind of jackal, with long legs and longish ears, of a rather pale sandy colour, and very slight build. I never succeeded in obtaining a specimen. It was probably *Canis riparius*, Hempr. and Ehr., described in the "Symbolæ Physicæ."

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[1] The skull of an old specimen of *C. aureus*, in the British Museum, measures in inches,—length, 5·75; breadth, 3·1; height, 2·7; and the teeth are much smaller than in *C. variegatus*, which is evidently a larger and more powerful animal.

ORDER *PACHYDERMATA.*

12. Phacochœrus Æliani, Rüpp.

Phacochærus Æliani, Rüpp. Atlas, t. 25, 26.
P. haroja, Hemp. and Ehr., Symb. Phys., t. 20.
P. æthiopicus, partim, Gray, P. Z. S. 1868, p. 46.

The wart-hog occurs throughout Abyssinia, if, as I have every reason to believe, the species occurring on the highlands is the same as that found at lower elevations. Near Annesley Bay it abounds, and I shot several fine specimens.

Its habits are very similar to those of ordinary pigs. It lives amongst bushes or in ravines during the day,[1] and comes out to feed in the evening, still keeping much to bush jungle. The large males are usually solitary; the younger animals and females live in small herds, apparently not exceeding eight or ten in number. I never saw large "sounders," such as are so commonly met with in the case of the Indian hog. It feeds much on roots, which it digs up by means of its huge tusks. It also appears to dig large holes, in which it occasionally lies. These are perhaps intended for the young.

Despite its formidable appearance, the Abyssinian wart-hog is a comparatively timid animal, far inferior in courage to the Indian wild hog. Several which I wounded showed no inclination to charge under circumstances in which an Indian pig would certainly have shown fight.

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[1] In P. Z. S. 1868, p. 45, *Phacochærus* is said by Dr. Gray to live floating amongst reeds. This is certainly not the case with the Abyssinian species, nor, so far as I am aware, with the South African animal generally.

The flesh is savoury, but dry and hard, even in comparatively young animals.

Ælian's wart-hog is considered by Dr. Gray, the last writer on the subject, identical with the South African *Phacochœrus æthiopicus*, Erxl. (*Sus africanus*, Gm.); and unquestionably Dr. Gray gives very strong arguments in favour of his views. My reasons for dissenting are: first, that Dr. Gray, from the nature of the specimens before him, was compelled to rely entirely upon cranial and osteological characters, and that I believe there are external differences in the two forms; secondly, that all the specimens in the British Museum appear to be from South or West Africa and not from Abyssinia; and it is most probable that the two races are representative.

The external differences are far from unimportant, as I judge from a fine adult South African specimen in the Gardens of the Zoological Society, and from the drawing in Major Cornwallis Harris's "Game Animals of South Africa." The ears in the South African species have tufts of long hair; this peculiarity is wanting in *P. Æliani:* and the form of the warty protuberances on the face is quite different in the two species,—in the males, at all events; in the females the warts are much smaller, and the upper ones are deficient. The colour of *P. æthiopicus* also appears much more rufous in general.

So far as regards the dental characters, all the evidence which I can add is in favour of the distinction. I brought away with me three skulls of large males. One is that of a very old animal with enormous tusks, the upper pair being no less than eleven inches long each outside the jaw, measured along and outside of the curve. In all three skulls both upper and lower incisors are permanent. In old specimens of *P. æthiopicus* both are generally wanting.[1]

13. **Rhinoceros keitloa,** A. Smith (*R. bicornis*, L. var.).

Bruce, Travels, vol. v. p. 85.
Smith, Illust. S. Afr., Zool.-Mamm. pl. 1.
Rhinaster keitloa, Gray, P. Z. S. 1867, p. 1025.

Rhinoceroses appear to be confined to the lower elevations in Abyssinia; they do not ascend above about 5,000 feet elevation in the northern portion of the country, and they are entirely wanting on the high plateau. I only met with them on the banks of the Anseba, where they were tolerably common. All belonged to the black type—the white African rhinoceros does not appear to have been met with north of the equator.

Although the rhinoceros of Abyssinia and Nubia was described long ago by Bruce,[2] very few specimens have ever reached Europe. The difficulty of carrying the spoils of so large an animal is very great. Mr. Jesse brought away the complete skeleton of an adult female, which is now in the British Museum. I only obtained the head and skull of a younger female, nearly adult, now deposited in the same collection. The animal is by no means easy to kill, and these two were the only ones bagged by our party. There is now a young male from Nubia in the Gardens of the Zoological Society.[1]

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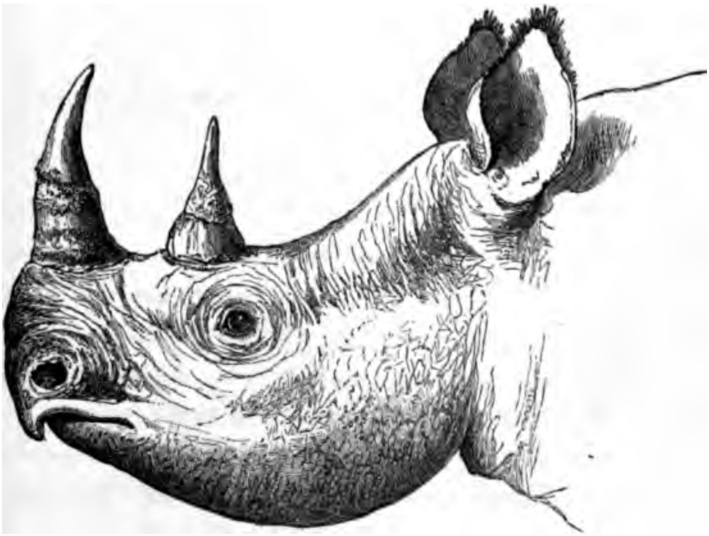
[1] *Vide* also Sclater, Proc. Zool. Soc. 1869, p. 276, pl. xx.

[2] Bruce's figure, however, represents an Indian (one-horned) Rhinoceros, with an additional horn.



The accompanying figures represent the head and horns of the younger female killed on the Anseba, the horns with a portion of the skull of the adult female, and the back view of the hinder horn of the latter, all drawn to a scale of one-tenth the natural size. A comparison of the last with the typical specimen of *R. keitloa* in the British Museum, or with the figure in Dr. Smith's "Illustrations of the Zoology of South Africa," will show the very close resemblance in form. In the typical specimen the horns are of equal length; in that from Abyssinia the front horn is 16 in. long, the hinder 12¾ in. The first is nearly circular in section throughout, being a little compressed above; the latter is much compressed, more sharply edged behind than in front. Half-way up it measures 2¼ in. from front to back, and 1½ in. across.

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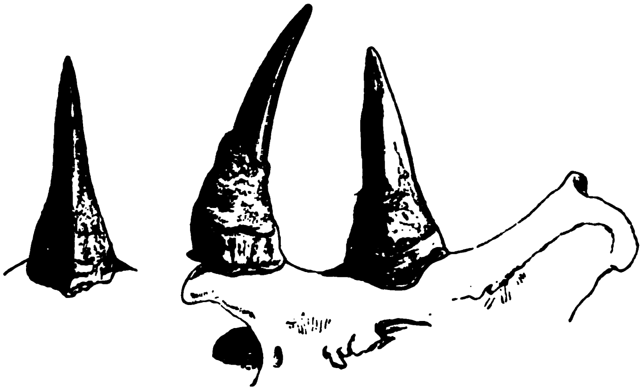
[1] Cf. Sclater, *Student and Intell. Obs.* 1869, p. 328.



The horns in the younger specimen measure—the anterior 12 in. along the curve in front, or 11 in. measured in a direct line from the centre of the base to the tip, while the hinder horn is 7¾ in. in length. The first is slightly compressed, having an oval section; the two diameters half-way up being 1·8 in. and 1·4 in. The hinder horn tapers suddenly below, and more gradually above; it is rather less compressed than the front one; the diameters, three inches from the tip, being 1·2 in. and 1 in.

In the young male in the Zoological Gardens, the horns are comparatively short, especially the hindermost, larger at the base, blunt, and nearly circular in section.

How much of the variation in the three different animals is due to age and sex, it is impossible to say without further information and additional specimens. It is quite possible that the horns may be variable in length, and in the extent to which they are compressed, and yet that *R. keitloa* may be perfectly distinct from *R. bicornis.*

In both the animals killed by our party, the elongated process of the upper lip was well developed, as it is also in the Zoological Society's specimen. The neck was rather long, and there was a distinct appearance of a hump on the shoulder, just as represented in Dr. Smith's figure. This was peculiarly conspicuous in the larger animal after death, as it lay upon its belly, with its legs doubled beneath, a position taken by both animals in dying. Immediately on returning to India after leaving Abyssinia, and referring to Dr. Smith's plates, I was struck by the great resemblance of his figure of *R. keitloa,* in the characters of general form as well as of the horns, to the Abyssinian animal, and I was glad to find that Dr. Gray, from an examination of the skull brought home by Mr. Jesse, arrived independently at the same conclusion as to the specific relations (*Ann. and Mag. Nat. Hist.* 1869, p. 201).

The rhinoceros of the Anseba inhabits the dense thickets on the bank of the stream, which are intersected in all directions by the paths made by these animals. In the densest parts, where roots and stems render the jungle almost impervious, there are places known by the inhabitants as rhinoceros-houses. The stems and branches have generally been broken away or pushed back, so as to leave a clear space about 15 ft. or 20 ft. in diameter, at the bottom of which the ground has been worn into a hollow by the trampling and rolling of the animals in wet weather. These houses are used as retreats during the heat of the day. On two or three occasions we disturbed a rhinoceros from one of these, and he rushed off with much noise and loud snorts through the bushes. So far as we could learn from our observations, these animals enter the thick jungle early in the morning and rest until one or two o'clock in the day; then they leave their thickets and go out to feed, usually remaining, however, amongst high bushes. At the time of the year in which we visited the country rain generally set in in the afternoon, and, if it did not rain, the sky was overcast; in the clear weather the rhinoceroses are said never to appear before evening. They are great browsers, feeding chiefly on the young shoots and branches of acacia and other trees, or on fruits; so far as I could see, they do not generally eat grass.

Their movements are very quick, their usual pace being a smart trot, and the numerous tracks show that they move about a good deal. The natives declare that it is impossible to escape from them even on horseback (I doubt this), but they are easily eluded by turning, as they are not quick of sight, and, like most mammalia, they never look for enemies in trees; consequently a man only two or three feet from the ground will remain unnoticed by them if he keeps quiet. They are said to be extremely savage, and unquestionably the first one killed by us charged most viciously. The same is related of the black rhinoceros by all African sportsmen. I cannot help thinking, however, that their savage disposition has been rather exaggerated. When on the Anseba, we heard numerous accounts of people having been killed by lions, panthers, and elephants; but Mr. Münzinger told me that, during his long experience in the country, he never knew of any one having been killed by a rhinoceros, although he himself had had a narrow escape when charged by an animal he had wounded.

The majority of the animals seen by our party were in pairs, an old female and a nearly full-grown cub. On one occasion Captain Mockler saw four together.

The only sound we heard them make was the snort of alarm or rage, so frequently referred to by Sir Samuel Baker in his description of the rhinoceroses met with by him on the Nile Tributaries in Western Abyssinia. It is a most peculiar noise, resembling that made by a locomotive more than any sound made by an animal with which I am acquainted.

The following are the dimensions of the larger rhinoceros killed, that of which the skeleton is in the British Museum :—

	ft.	in.
Length of head from snout to between the ears . . .	2	8
„ neck and body from between ears to insertion of tail	7	1½
„ tail	1	9½
Total length from nose to end of tail, measured along the curve of the back	11	7
Length of body measured along side from shoulder to rump	6	9
Height at shoulder	4	8½

I am indebted to Mr. Jesse for these measurements. I had, unfortunately, no tape with me when we killed the animal, and Mr. Jesse took them from the carcase next morning.

14. **Hyrax abyssinicus**, Hemp. and Ehr.

H. habessinicus, Hemp. and Ehr., Symb. Phys., t. ii., smaller specimen in lower figure (nec *Euhyrax abyssinicus*, Gray, Ann. and Mag. Nat. Hist. vol. i. p. 47).

The synonymy of the North African Hyraces is enveloped in the direst confusion. Dr. Gray recently attempted to clear this up in a paper published in the *Annals and Magazine of Natural History* for 1868, Ser. 4, vol. i. p. 35, and subsequently reprinted in the British Museum Catalogue of "Carnivorous, &c., Mammalia," p. 279; but in consequence of not having had access to the types described by previous authors, he has in some instances mistaken other forms for them. The excessive variation to which the common Abyssinian species is liable has also caused it to be greatly subdivided; but so much do skins vary in colour that I am by no means surprised that naturalists, having only access to a few specimens in a museum, should consider that they had evidence of the existence of several species.

Being aware of the difficulties which existed, I endeavoured, when in Abyssinia, to obtain as large a series as I possibly could, and I brought away with me twenty-eight skins from different parts of the country. Since my return to Europe I have not only compared these with the types described by Dr. Gray, but I have also examined the specimens in the Berlin Museum which were collected by Hemprich and Ehrenberg and described and figured in the "Symbolæ Physicæ." The conclusion at which I have arrived is that there are probably five[1] (perhaps six) distinguishable races of Hyrax in North-eastern Africa, one or two of which appear to be new; but so great is the difficulty of distinguishing between the different forms, and such is the risk of error, that I hesitate to add to the already very considerable list of names, as of the supposed new species I have in one case one, in the other two, specimens only.

The principal characters relied upon by Dr. Gray for the classification of the *Hyraces* are the form of the skull, the colour of the dorsal spot, the harshness or softness of the hair, and its coloration. All of these characters appear to me to be remarkably variable in the genus *Hyrax*, and especially in specimens from Abyssinia.

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[1] The two species not obtained by me are *H. ruficeps vel dongolanus* of Ehrenberg, which, from an examination of the types of both specimens, I have ascertained to be the same as *H. Burtoni* of Gray; and the Shoa animal called *Euhyrax abyssinicus* by Gray.

The first specimen shot by me in Abyssinia was killed on the shore of Annesley Bay. It is quite a young animal, and not fully grown, but appears smaller than specimens of the same age from the highlands; the few other specimens seen by me at the same time were also small. The skin in question measures barely a foot from nose to rump. The sole of the forefoot is $1\frac{1}{4}$ inches long; that of the hindfoot $1\frac{9}{10}$. The fur is unusually thin and short, being scarcely half an inch in length anywhere, and rather harsh in texture. The general colour is brown; the hairs are dull brown at the base, with yellowish tips. There is a rudimentary black dorsal spot.

With some little doubt I refer this specimen to *H. abyssinicus.* Of the type specimens of that species in the Berlin Museum, the largest is about eighteen inches long; it is an old animal with large teeth. The colour is grey, with slight mottling, owing to the hairs being brown at the base, then dirty white for about one-eighth of an inch, and black at the tip. The fur is neither very coarse nor very fine. The under parts are dull grey. There is a small, not very distinct, black dorsal spot, the hairs in which are black throughout in the older specimen, but only at the tip in a younger skin. Both specimens are said to have been obtained near Massowa.

The species identified by Dr. Gray with Ehrenberg's

H. abyssinicus is a very distinct form, and, as stated by Dr, Gray, the skin alone is undistinguishable from that of *Hyrax capensis.* It is a very much larger species than any of the common Abyssinian forms, very dark-coloured above and dusky beneath, with long, soft fur, and a very conspicuous black dorsal spot.

I think it probable that the true *Hyrax abyssinicus* of Ehrenberg inhabits the neighbourhood of the coast only. The highland species, which is far better known, is the following:—

15. Hyrax Brucei, Gray.

Ashkoko, Bruce's Travels, vol. v. p. 139, with plate.
Hyrax syriacus, Schreber, Saughth. iv. p. 314, t. 240.
H. Brucei, Gray, Ann. and Mag. N. H. 1868, i. p. 44.—Cat. Carn. &c. Mam. Brit. Mus. p. 287.
H. Alpini, Gray, Ann. and Mag. 1868, p. 45.—Cat. Brit. Mus. p. 287.
H. ferrugineus, Gray, Ann. and Mag. 1869, vol. iii. p. 242.—Cat. Brit. Mus. p. 288.
H. irrorata, Gray, and var. *luteogaster*, Ann. and Mag. 1869, p. 242.—Cat. Brit. Mus. p. 288.

After long and careful examination both of the skins and skulls of all the Abyssinian Hyraces which I have been able to see, including the large series of specimens obtained by myself, I am unable to find any constant character by which the different forms above enumerated can be discriminated. In several specimens collected by me, mostly from lower elevations, there is either no trace or only the faintest rudiment of a dorsal spot. When present this is yellow. I was at first disposed to consider those specimens in which the dorsal spot is inconspicuous or absent as belonging to a distinct race, and it appeared much as if there was a cranial difference also, the length of the diastema being proportionally greater in the unspotted specimens; but more careful examination showed that it is only in one or two skins that there is absolutely no trace of a dorsal spot, and that those belong to young individuals, in which it is usually less well-marked than in adults, whilst the proportional length of the diastema is a character of very dubious value. In two skulls before me of about the same age, and of animals which were, I believe, obtained from the same burrow, the relative length in the upper jaw of the diastema and of the first three molars is in one specimen 0·35 to 0·48 inch; in the other, 0·46 to 0·48. The skins only differ in one being more ferrugineous than the other, a character rarely of much value amongst mammalia in general, and, as I have ascertained by repeated observations, of not the slightest importance amongst Abyssinian Hyraces. I have, in repeated instances, seen several animals amongst those scattered over the face of a cliff, or lying out on large stones, which were far more rufous than their companions of the same burrow.

Of the specimens collected by me which I refer to this species, one was shot at Upper Suru only 2,000 feet above the sea; one at Undul Wells at about 4,000 feet; three at Senafé, 8,000 feet; one at Agula, one at Antalo, both 7,000 feet; one in the Anseba valley, 4,000 feet; and sixteen at Adigrat, 8,000 feet. Amongst this series I find every gradation between the four forms described by Dr. Gray. There can, I think, be but little hesitation after examining my specimens that the slight differences of colour upon which *H. Alpini* was distinguished from *H. Brucei* are not of specific value, and, in illustration of this fact, I may state that when collecting in Abyssinia I never could quite determine to which of the two forms I should refer specimens. As mentioned before, the amount of variation is very remarkable, and it is not surprising that Dr. Gray should have been misled by the few specimens in his possession. *Hyrax ferrugineus* is the rufous phase, which is certainly not more than an individual variety; and the only race about which I ever had the least doubt is *H. irroratus,* which is the variety with the rudimentary dorsal spot; and in that case also I can see no constant distinction whatever. A large series of my specimens are deposited in the British Museum, and available for comparison, and I feel confident that any one who examines them will come to the same conclusion as myself.

By far the greatest amount of variation exists amongst the specimens from Adigrat, and there are two of these which differ so much from the others that they may belong to distinct species. But after my experience of the variation of which Hyraces are susceptible, I would not think of distinguishing forms on the evidence of a single specimen.

The first of these aberrant specimens (No. 786) approaches the type of *H. Brucei* of Gray; but it has longer and finer fur, and is greyer and less rufous in colour. The fur is dusky at the base, becoming black near the end, and tipped with white. There is a distinct longitudinal, yellow, dorsal spot. The animal is fully adult, but not aged. The skull is much crushed, and I have not extracted it.

The second specimen (No. 886) differs even more from the type, and very possibly should be classed with the next species. It is of a very dark brown colour, much mottled with black, all the under fur being blackish; the hairs are yellowish brown near the end and tipped with black. There is a rudimentary *black* dorsal spot, the hairs on the centre of the back being quite black near the base, and only very slightly tipped with paler colour.

The habits of the Abyssinian Hyraces are precisely similar to those of Syria and the Cape. They live in rocky or stony places, in communities, like rabbits, haunting holes beneath the rocks. A large pile of loose blocks, especially if there are precipices around, is sure to be inhabited by them. They are frequently found, too, in rocky watercourses. They appear to feed at night and very early in the morning, their principal food being the leaves and young shoots of trees and bushes. In the stomach I invariably found a green mass too much crushed for the separate leaves to be distinguished. During the day they lie out upon rocks in the shade, or retire, especially towards midday, beneath the rocks. They are timid and wary, rushing into their holes at the smallest intimation of danger. The only sound I heard made by them was a shrill squeak when suddenly alarmed. They can climb over smooth surfaces of rock in a wonderful manner, their large flat feet aiding them in obtaining a hold.

The following measurements were taken from a freshly-killed adult female shot at Senafé :—

	ft.	in.
Length of face, from end of nose to between ears . .	0	3·5
„ of neck, from between ears to top of shoulder	0	3
„ from shoulder to rump	1	1·5
Total length, measured along the curve of the back .	1	8
Length of body, from shoulder to rump, measured along the side	1	3
Height at shoulder	0	8
Girth of neck	0	7·5
„ chest behind the shoulder	1	1·5
Length of ear	0	0·75
Breadth of ear	0	0·87
Length of longest hairs in moustache	0	2·5
„ forefoot and toes	0	1·62
„ middle toe of forefoot	0	·3
„ radius	0	2·5
„ hindfoot and toes	0	1·62
„ outer toe of hindfoot	0	·3
„ middle toe of hindfoot	0	·6
„ inner toe of hindfoot	0	·75
„ tibia	0	3·5

There are six mammæ, four inguinal and two pectoral : the former are very lateral, just in front of the thigh and about ¾-inch apart.

In one of the skulls brought back by me belonging to a very aged animal killed at Suru, there is a very remarkable dental character. At the back of all the molars on each side of the upper jaw there is a pointed tusk-like tooth, shaped like a canine, the point projecting a little above the crowns of the molars. The series of grinders is complete, being seven in number, and the teeth are considerably worn. The canines in this specimen are rounded in front, not ridged as usual.

Of the three skeletons brought back two have twenty-one, one twenty pairs of ribs. All have twenty-eight dorsal vertebræ.

16. Hyrax, ? sp. nov.

Two specimens from Gaso and Santara on the Dalanta plateau differ from all the others in having a distinct small black dorsal spot. They are very dark and much less mottled than usual; the hair is longer and moderately fine. The soles of the feet, of the hinder ones especially, appear to be rather shorter than usual. The nasal bones of the skull appear shorter, but neither specimen is quite adult. Still compared with specimens of *H. Brucei* of the same age there appears a difference, the height of the posterior portion of the skull in the latter being less in proportion to the length. In the Dalanta specimens the zygomatic arch is broader than usual. The series of molars in the upper jaw are much curved.

I am inclined to consider this a distinct form, and I doubt if it be the young of the Shoa species called *Euhyrax abyssinicus* by Dr. Gray. It appears to me a smaller animal. My largest specimen is nearly adult and wants the small front premolar on each side of both jaws. This tooth is occasionally wanting here and there in other skulls, and is generally deficient in the lower jaw of aged specimens, but amongst eight adult skulls before me I find no other instance of its absence throughout both jaws.

17. **Elephas** (*Loxodonta*) **Africanus**, Cuvier.

Cuv. Règne Animal, ii. p. 231.

Elephants were not very uncommon in the neighbourhood of Annesley Bay, and several were killed by some of the sportsmen in the army, whilst their footprints and the dried droppings were conspicuous everywhere. Farther north, near Massowa, we met with their tracks in all the valleys traversed, but we very rarely saw the animals themselves, and we only killed a small herd of five at Kokai, in the Lebka valley, as related on a previous page.

The differences between the form and habits of the Indian and African Elephants have been so frequently described, and both species have of late years become so well known by the exhibition of specimens in the various Zoological Gardens in Europe, that but few remarks are necessary. The impression produced upon all who saw the Abyssinian Elephants was that they were more active and better climbers than the Indian animals, and also that they were more savage in disposition. They often inhabit steep hill-sides, and the rapidity with which they ascend and descend these was described as marvellous by some of those who witnessed them.

The conduct of the small herd at Kokai was very curious, illustrating the boldness of the creatures in remaining all day in the midst of men and domestic animals, while at the same time they afforded a remarkable case of stupidity when attacked. On a subsequent occasion Captain Mockler attacked a herd of very large Elephants; and at the first shot the whole herd turned upon him although they were previously quite unaware of his presence, and he only saved his life by running and hiding himself in a bush.

The Elephants near the Abyssinian coast migrate with the season, coming to the coast in the winter and spring, when rain falls and there is abundance of green food, and returning to the hills about June and July, when the monsoon rain commences. They ascend the various plateaux near the Anseba valley to a height of 7,000 or 8,000 feet, partly in all probability to escape from the flies, which are very troublesome in the lower ground at that season.

All of the Elephants in Eastern and Northern Abyssinia appear to be almost tuskless or to have very small and short tusks, a most unusual occurrence in the African Elephant, though tuskless varieties of the Asiatic species are extremely common in India and other parts of South-eastern Asia, and in Ceylon a tusker is very rare indeed. In Western Abyssinia, on the Barka, Mareb, and Atbara, the Elephants have fine tusks, and are much hunted in consequence.

Sir Emerson Tennent, in his description of the Elephant of Ceylon, especially notices the circumstance that all the animals in one herd are generally, if not always, part of the same family. The little herd killed by us at Kokai evidently consisted of an old female and four younger Elephants, her offspring in different stages of growth; and subsequently Captain Mockler saw a herd of nine, consisting in a similar manner of a very large female and of eight younger animals varying in size from adult down to a little beast not higher than a Shetland pony. It is very probable that all herds consist of animals closely related by consanguinity.

The dimensions of the old female and of the largest male killed at Kokai were:—

	Female.		Male.	
	ft.	in.	ft.	in.
Height at shoulder	7	8	7	4
From top of head, between base of ears to top of shoulder	1	5	1	6
From top of shoulder to insertion of tail . .	7	3	6	3
Length of body from shoulder to rump, measured along the side in a direct line . .	7	3	6	6
Circumference of forefoot	3	7½	—	

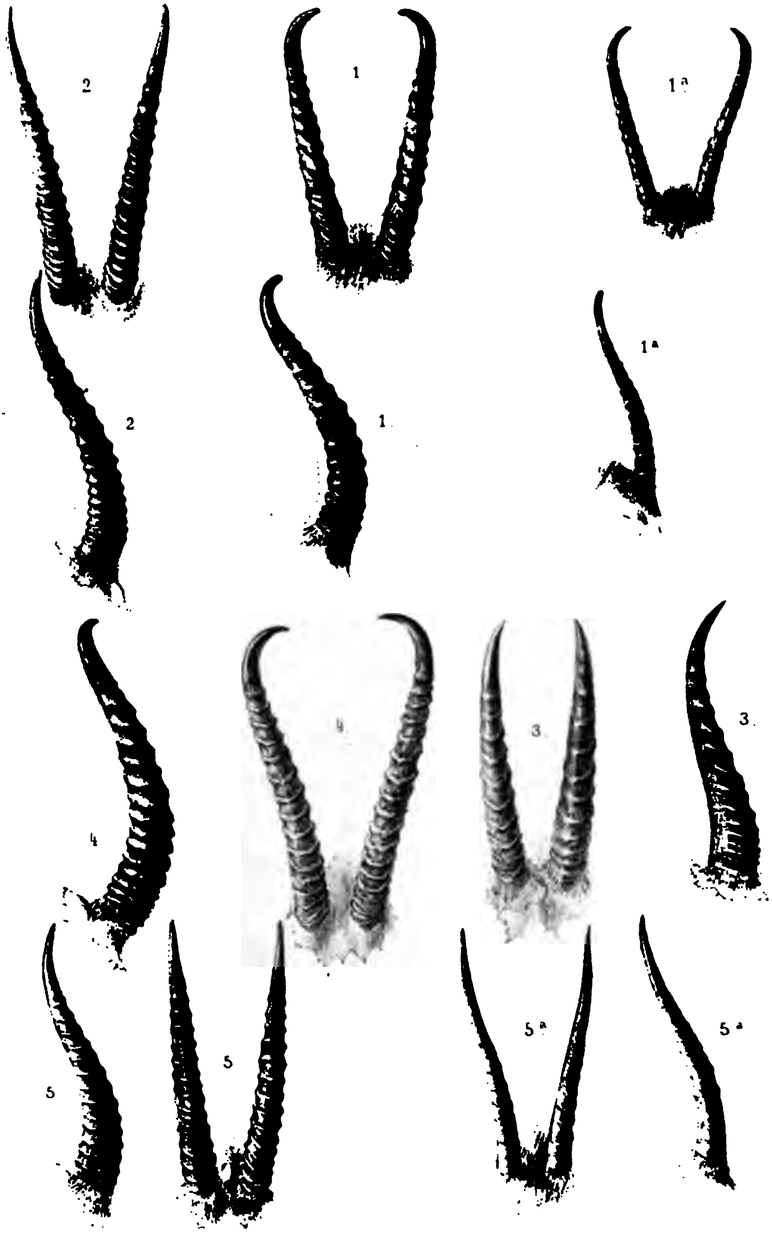
ORDER *RUMINANTIA.*

18. Gazella Sœmmerringii, Rüpp.

Antilope Sœmmerringii, Rüpp. Atlas, t. 19.—Brehm, Habesch, p. 65.

This Antelope abounds on the coast of the Red Sea, near Annesley Bay and Massowa, but never ascends the hills. It inhabits principally the low bush and acacia scrub, and is found in herds varying from a few individuals up to 100 or more. It appeared to me that the herds were larger in the winter than in the summer, but around Annesley Bay many had been driven from their usual haunts by the unwonted presence of so many men, and several herds must frequently have united. In one instance, at Arafiló, an immense assemblage of at least 300 to 400 inhabited a large plain south of the Egyptian camp. A very large number were shot by the sportsmen of the army. The flesh is excellent.

Sœmmerring's Gazelle belongs to the same section of



[illegible]

1. GAZELLA DORCAS.
1a G. „ ♀.
2. G. BENNETTI.
3. G ARABICA.
4. G. SUBGUTTUROSA.
5. G. SPEKEI.
5a G. „ ♀.

[illegible]

the genus as *G. dama* and *G. euchore*, distinguished from *G. dorcas* and its allies, the true gazelles, by their less symmetrical form and longer legs, and by their habit of keeping in herds of considerable size. Their pace is rapid, usually a long trot: I never saw them bound like the Springbok or like *Antilope bezoartica* of India.

On one or two occasions I saw tracks of *Gazella Sœmmerringii* near water, and Captain Mockler shot one while drinking. The hour of drinking appears to be usually a little before midday. In this it differs from *Gazella dorcas* and its near ally *G. Bennetti* of India, which never drink.

19. G. dorcas, L.

Capra dorcas, L. Syst. Nat., Ed. 12a, i. p. 96.

The true Gazelle of the Abyssinian coast-land appears to differ in no essential character from that of Northern Africa. A distinguishable race inhabits the opposite shore of the Red Sea (*G. arabica*, H. and E.), and a third form, *G. Spekei*, Blyth, occurs on the African coast further south in the Somali country. Figures of the horns of all these races are appended (Plate I), as well as of two other Asiatic Gazelles, *G. subgutturosa* of Persia and Beloochistan, and *G. Bennetti* of India. The figures of *G. dorcas* are from specimens shot by myself near Zulla; that of *G. arabica* from a head for which I am indebted to Captain Heysham of the Commissariat, who obtained it at Mocha. The figured heads, male and female, of *G. Spekei*, are the specimens described by Mr. Blyth in the *Journal of the Asiatic Society* *of Bengal* for 1856, vol. xxiv. p. 296, and now in the Indian Museum at Calcutta. Those of *G. subgutturosa* are in the same museum, and were brought from Afghanistan, I believe, by Captain Hutton. The figures of the horns of *G. Bennetti* are taken from an animal shot by myself in Western India. The length of the horns varies much with age, but the curve appears to be fairly constant.

So far as my observation extends, neither the Dorcas nor Bennett's Gazelle are ever seen in large flocks, like the animals of the Springbok group. Usually both are seen solitary or from two to five together, inhabiting thin bushes, generally in broken ground. They feed much upon the leaves of bushes. The male has a peculiar habit when surprised of standing still and uttering a short sharp cry. Like most Antelopes, they keep much to the neighbourhood of some particular spot. After long observation, I am convinced that Bennett's Gazelle never drinks, and all that I could ascertain of the Dorcas Gazelle leads to the same conclusion in its case. It would be interesting to ascertain if all these peculiarities are shared by the little group allied to *G. dorcas*, or the true Gazelles, as distinguished from the group to which belong *G. dama*, *G. euchore*, and *G. Sœmmerringii*.

20. Oryx beisa, Rüpp.

***Antilope beisa*, Rüpp. Neu. Wirb. p. 14, t. 5.—Brehm, Habesch, p. 66.**

I never saw any other Antelope except the two species of Gazelle and *Neotragus Hemprichii* near Annesley Bay, and I never heard of the occurrence of Oryx till

I was north of Massowa. On our journey to the Anseba and Bogos, we met with none, though Captain Mockler and I found their fresh tracks near one of the drinking-places; but when returning, I stopped for three days at a halting-place in the semi-desert north of Massowa, and I succeeded in shooting four of these superb and rare Antelopes. All were females: but there is little, if any, difference in the sexes, both having equally fine horns.

The Beisa is found singly or in small herds, rarely exceeding ten in number, in the somewhat hilly barren country near the sea-coast. They are said to keep to the more hilly parts of Samhar. Near Annesley Bay, where the country is more wooded, this Antelope does not occur, but it abounds farther south in the Somali country, and the horns are brought in considerable numbers to Aden from Berbera. They are used as weapons by the Somalis.

The principal food of the Oryx near Massowa is a coarse grass almost resembling a diminutive bamboo. They appear to be grazers rather than browsers, although, like all Antelopes, they occasionally eat the young shoots of Acacia and other trees. They are quite diurnal in their habits, feeding in the morning and evening, in this respect resembling the Gazelles, to which they are unquestionably closely allied. When we were in the Samhar country in July and August, the Oryx drank apparently every day, always coming to the water about one or two o'clock. It is probable that they drink less regularly in cold weather.

The appearance of a herd of Oryx is very imposing. They are some of the most elegant and symmetrical of animals, the motions being those of a wild horse rather than of an Antelope. Their favourite pace appears to be either a steady quick wlak or a trot; they rarely break into a gallop, unless greatly alarmed. When frightened, they dash off, sometimes snorting and putting their heads down as if charging, raising their long tails, and looking very formidable. They are wary animals, though far less so than some other Antelopes. It is said that they frequently attack when wounded, and their long straight horns are most deadly weapons. Stories are told of the Cape Oryx, an allied but distinct species, killing Lions; and I heard of a commissariat contractor who was bringing Camels to Annesley Bay, and wounded an Oryx near Massowa, being charged by it: but nothing of the kind happened to myself, although I had to pursue two of the animals I killed for a long distance after wounding them; and one with a broken leg I fairly ran down. The shooting of these animals is described on an earlier page.

Like the Gazelles and true Antelopes, all equally inhabitants of deserts and open plains, the Oryx has a pointed foot, each of the divisions being rudely triangular. Its tracks may consequently be instantly distinguished from those of cattle or of any of the bovine Antelopes. So far as my acquaintance with the family goes, most of the forest and bush-haunting Antelopes, Koodoo—Nylgai, *Tetraceros*—have their feet formed like those of the *Cervidæ*, with rounded hoofs, whilst the Antelopes of the plain, and especially desert forms, have pointed hoofs.

The following are the dimensions of a female :—

	ft.	in.
Length of face from nose to between ears	1	5
„ neck from between ears to top of shoulder	1	6
„ back from top of shoulder to insertion of tail	3	1
„ tail, 1 ft. 3 in., hairs beyond end 11 in., total	2	2
Total length from nose to end of tail measured along the curve of the back	8	2
Length of the body measured in a direct line along the side, from the front of the shoulder to the rump	3	7
Height at shoulder	3	7
Girth of chest behind shoulders	3	10
„ neck	1	8
„ head over forehead	2	0
„ forearm	0	9
Length of horns	2	6
„ ear	4	8
Width of ear	0	4
Length of forearm (measured outside skin)	1	2
„ cannon bone „	0	9
„ fetlock to toe	3	6
„ thigh from stifle to hock, measured in front, outside skin	1	2
„ back to hind fetlock, also measured in front	1	2
„ fetlock to hind toe	0	6

21. **Oreotragus saltatrix** (Bodd.).

Antilope Oreotragus, Gmel. Syst. Nat. i. p. 189.
Oreotragus saltatrix, Brehm, Habesch, p. 65.

The Klipspringer is common on the more rocky of the Abyssinian hills, from a height of about 3,000 feet above the sea, or rather less, to 8,000 or 9,000. In the pass below Senafé, and in that leading from Ain to the Anseba, by the valley of the Lebka, these little mountain

Antelopes were frequently seen, and they were common on some of the rocky precipices on the flanks of the great valleys around Senafé, Guna Guna, Fokada, &c., usually solitary or in pairs. When alarmed they frequently perch on the very highest rocks, their agility in leaping from crag to crag being remarkable.

The very peculiar face of the Klipspringer resembles in a most remarkable manner that of the Musk-deer of the Himalaya and Central Asia, *Moschus moschiferus,* and the general build is also similar. There is probably much resemblance in their habits, but the Musk Deer appears to be more of a forest animal. The following are the dimensions of a female Klipspringer shot at Senafé :—

	ft.	in.
Length of face from nose to between ears	0	6
„ neck and body from between ears to insertion of tail	2	3
„ tail, including hairs at end	0	4
Total length from nose to end of tail, measured along the curve of the back	3	1
Length of the body measured in a direct line along the side, from the front of the shoulder to the rump	1	11
Height at shoulder	1	6
Girth of chest behind shoulders	1	10
„ neck	1	0
Length of ear	0	4

22. Scopophorus montanus, Rüpp.

Antilope montana, Rüpp. Atlas, t. 3.

This peculiar little Antelope was rare in the country traversed; I only saw it two or three times near Dolo and

Harkhallat, north of Antalo, at an elevation of about 7,000 feet above the sea. It inhabits bushy ground or high grass.

I shot a buck, but omitted to take the complete dimensions; it was 1 ft. 10½ in. high at the shoulder, and the length of the body measured in a straight line from the shoulder to the rump was 26 inches. The mammæ are four in number, the suborbital and inguinal glands well developed, and it has the peculiar bare spot at the base of each ear characteristic of this genus of Antelopes.

23. Cephalophus madoqua, Rüpp.

Antilope madoqua, Rüpp. Neu. Wirb. p. 22, t. 7, p. 2.

This bush Antelope is not rare on the highlands at elevations of 7,000 to 8,000 feet. I usually saw it solitary. It keeps to bushes and small clearings.

I shot two bucks; one at Dildi (1), the other at Dongolo (2). The following are the dimensions:—

	1.		2.	
	ft.	in.	ft.	in.
Length of face from nose to base of horns . .	0	6	0	6
„ neck from base of horns to top of shoulder	0	8½	0	9
„ back, from top of shoulder to insertion of tail	1	7	1	7½
„ tail	0	4	0	4½
„ hairs at end of tail	0	3	0	3
Total length from nose to end of tail measured along the curve of the back	3	4½	3	6
Length of body, measured in a straight line along the side, from front of shoulder to rump	1	10	1	9½
Height at shoulder	1	9	1	10
„ rump	—		1	11

	1.		2.	
	ft.	in.	ft.	in.
Girth of chest behind shoulder	1	8½	1	9½
„ neck	0	9	0	9½
Length of foreleg	1	0½	1	1
„ of radius	0	6	0	6½
„ from knee to fetlock	0	4½	0	4
„ from fetlock to heel of hoof	0	2	0	2
„ of thigh (tibia)	—		0	8
„ from hock to hind fetlock	—		0	7
„ from fetlock to heel	—		0	2½

The suborbital gland is closed. It is brown.

24. **Neotragus saltianus**, Blainv.

Antilope saltiana, Blainv. Bull. Soc. Philom. 1816.—Rüppell, Atlas, t. 21.—Hempr. and Ehr., Symb. Phys., t. vii.
Antilope hemprichiana, Hempr. and Ehr., Symb. Phys.

The "*Beni Israel*" or "*Om-dig-dig*," one of the smallest Antelopes known, abounds on the shores of the Red Sea and throughout the tropical and sub-tropical regions of Abyssinia. It is occasionally, but rarely, found at higher elevations; I heard of instances of its being shot both at Senafé and Dildi; but it is not often seen above about 6,000 feet. It inhabits bushes, keeping much to heavy jungle on the banks of watercourses, and is usually single, or in pairs, either a male and female or a female and young being found together; less often the female is accompanied by two younger ones, which remain with her until full-grown.

Brehm gives a long and most interesting account of the habits of this little Antelope, which appears to me to agree generally with my own observations. The fact to which he particularly calls attention, and which he gives on the authority of a missionary who had long resided at

Keren, is the attachment which these animals show for particular spots, in which they may be found day after day ; and yet if the animal which occupies a particular station be killed, another will be found in many instances within a few days to have taken possession of the vacant post. I had no opportunity of noticing whether this was the case with the Beni Israel, but it is so common an occurrence amongst wild mammals, not merely with Ruminants, but with Carnivora also, that I have no doubt of its accuracy. It is not even peculiar to mammalia.

Like *Gazella dorcas* and many larger Antelopes, the Beni Israel has the habit of depositing its dung frequently on the same spot, so that its usual haunts may be known by little piles of its droppings. It rarely leaves the shelter of the bushes during the day, and is, I suspect, somewhat nocturnal in its habits, as I have seen it feeding on leaves at the edges of the jungle in the dusk of evening.

All the specimens of Salt's Antelope seen in the Anseba valley differed from those of the coast and of the pass between Komayli and Senafé in their much more rufous colour. There being no distinction, so far as I can see, in size or shape, I am inclined to look upon this as an unimportant variation—the more so that, as previously noticed when speaking of the *Hyraces*, many animals, and especially mammals, have a tendency at times or in particular localities to assume a rufous phase; so that the difference between rufous and grey, or rufous and brown, is one of the least characteristic and certain of specific distinctions.

The following are the dimensions of a full-grown female of Salt's Antelope (the specimen measured being the rufous variety) :—

	ft.	in.
Length of face from nose to between ears	0	5
„ neck from between ears to top of shoulder	0	7
„ back from top of shoulder to rump	1	1½
„ tail, 1½ in.; hairs beyond end of tail, 1 in.	0	2½
Total length from nose to end of tail, measured along the curve of the back	2	4
Length of the body, measured in a straight line from the front of the shoulder to the rump	1	3
Height at shoulder	1	4
Girth of chest behind shoulder	1	3¼
„ neck	0	5¼
„ head in front of the ears	0	8½
„ forearm	0	3
Length of ear	0	3¼
Longest hairs of forehead tuft	0	1¾
Length of forearm (radius), from elbow to knee	0	4½
„ of cannon-bone from knee to fetlock	0	3½
„ from fetlock to toe	0	2¼
„ of thigh (tibia) from hip to hock	0	5¼
„ from hock to hind fetlock	0	4½
„ from fetlock to toe	0	2⅓

The flesh of Salt's Antelope is inferior to that of any others that I have ever eaten; not only is it hard and dry, but it has a peculiar unpleasant musky flavour.

25. Strepsiceros Kudu, H. Smith.

Antilope strepsiceros, Gmel. Syst. Nat. i. p. 192.

The Koodoo is by far the finest of the Antelopes inhabiting the Abyssinian highlands. It occurs in all the wilder and more wooded parts of the country from an elevation of about 3,000 feet to 8,000 or 9,000, or throughout the sub-tropical and temperate zones. It is usually found in forest or bush jungle, rarely in the open, except in the early morning and evening, and it appears to love the hill-sides rather than level country. The males are generally seen solitary or two or three together; the females and young animals in herds of from four or five to about fifteen. At those periods of the year in which I most frequently saw Koodoo, viz. around Senafé in February and March, and in the Anseba valley in July and August, the bucks were rarely met with in company of the does.

The Koodoo is a very timid and wary animal, probably partly on account of the persecution it undergoes. Many are killed by the Abyssinians, who are not, however, great hunters; perhaps even a larger number fall a prey to Lions. It is probable that this magnificent Antelope might be acclimatized in Europe, where it would certainly be a valuable acquisition. The flesh is delicious, and the animal is very handsome, the large spiral horns of the male being scarcely equalled in beauty by any other of the family. The bluish grey colour and white stripes are peculiar. As usual, the adult male is darker and less rufous than the female, and the young is much redder, being almost fawn-coloured.

The following are the dimensions of an adult but not aged male, shot in the Anseba valley:—

	ft.	in.
Length of face from nose to base of horns	1	2
„ from base of horns to top of shoulder	2	6
„ from top of shoulder to insertion of tail	3	8
„ of tail, including hairs at the end	1	6
Total length from nose to end of tail, measured along the curve of the back	8	10

	ft.	in.
Length of the body, measured in a direct line along the side, from the front of the shoulder to the rump	4	5
Height at shoulder	4	4
Length of forearm (radius) from elbow to knee	1	4
„ of cannon-bone from knee to fetlock	1	1½
„ of thigh (tibia)	1	4
„ from hock to hind fetlock	1	4
„ of each horn, measured in a straight line from point to base	2	2
„ of each horn, measured along curve	2	10
Distance between points of horns	2	3
Length of ears	1	0

The horns were only of moderate size; in large specimens they are nearly three feet long.

Mr. Blyth has lately shown (P. Z. S. 1869, p. 51) that a smaller race of Koodoo exists in S. Africa, and probably in Abyssinia. I did not meet with this race or its horns.

Domestic Ruminants.

Before quitting the subject of the *Ruminantia*, a few words on the domestic cattle, sheep, and goats may not be out of place.

All the oxen of Abyssinia belong to the humped race, *Bos zebu*, and have the peculiar voice and habits of their species. The hump, however, is smaller than in the cattle of Hindustan; I never saw bulls with the very remarkable dorsal boss so characteristic of the better-bred Indian animals. The Abyssinian cattle are small in general: the finest seen by me were those of the Wadela and Dalanta plateaux. They vary in colour, being mostly brown or brown and white. The horns are usually ill-shaped. The famous Galla oxen appear to be peculiar to the countries lying east of Antalo, and I saw none myself.

The sheep kept by the Abyssinians of the highlands belong entirely, so far as my observations extended, to the short and fat-tailed race (*Ovis steatopygus*). They are covered with wool, not like the well-known Somali breed, commonly known throughout the East as Aden sheep, which have a clothing of hair. The horns are frequently well-developed and handsomely curved. The sheep kept by the Habab tribes near the coast, and by the Shohos, belong to the long-tailed race, and much resemble the Indian sheep. They have short wool, and are generally hornless.

Immense numbers of goats are kept by the Shohos and Habab tribes. The males are very fine animals, with horns sometimes two feet in length, twisted slightly, and very upright, much resembling those of the Markhor (*Capra megaceros*).

ORDER *RODENTIA*.

26. **Lepus ægyptius**, Geoffroy.

Description de l' Égypte.
L. ægyptiacus, Hemp. and Ehr., Symb. Phys., t. xv. fig. 1.
L. libycus, H. and E. (Berlin Museum).
L. habessinicus, Brehm, Habesch, p. 64.
L. abyssinicus, Gray, Ann. and Mag. Nat. Hist. 1867, p. 223.

I can see no good reason for distinguishing the common Hare of the Abyssinian coast-land from the desert Hare of Egypt. It is a small greyish animal, very slight in the body, with long legs and very large ears. It has been by some naturalists looked upon as the *Lepus* *habessinicus* of Hemprich and Ehrenberg. It does not, however, agree with the description in the "Symbolæ Physicæ;" and the type specimen in the Berlin Museum, which I have examined in order to decide the question, is certainly a different animal, similar in size, but with small ears instead of unusually large ones, these being only 3¾ in. long in the stuffed skin.

The following is a brief description of the type specimen of *L. habessinicus*:—The colour grey, mottled with dusky, as usual, especially on the back; nape pale rufous, albescent behind the ears; white marks at side of face indistinct. General size and build similar to *L. ægyptius*, or, perhaps, a little larger. It approaches still more closely to the specimen of *L. sinaiticus*, H. and E.

The following are a few dimensions:—

	in.
Length of face from between ears and nose measured over curve of the head	4
Base of ear in front to nose, in a direct line	3½
Length of forearm (radius) and carpus from elbow-joint to end of toe	5
" tibia	4½
" tarsus from tarsal point to point of toe . . .	4½
" ears, as above	3¾

The following are dimensions of three specimens of *Lepus ægyptius* shot near Zulla, taken from the animals before skinning:—

	1.		2. Male.		3. Female.	
	ft.	in.	ft.	in.	ft.	in.
Length of face, from nose to between ears	0	4	0	4	0	3¾
" from between ears to top of shoulder	0	3	0	3¼	0	4½
" from top of shoulder to rump .	1	0	1	0	1	2
" of tail, to end of hairs . . .	0	3½	0	3½	—	
	1	10½	1	10¾		

	1.		2. Male.		3. Female.	
	ft.	in.	ft.	in.	ft	in.
Length of body measured in a direct line along the side from front of shoulder to rump	1	1	1	1	1	3½
Height at shoulder	—		0	10	0	11¾
Depth of body behind shoulder	0	4½				
Girth of chest behind shoulder	—		0	9	0	9¾
„ neck	0	6	—		0	7½
Length of forearm (radius), from elbow to carpal joint	0	4¼				
Length of carpus to point of toe	0	2¼				
„ of middle fore-toe	0	1½				
„ of thigh (tibia)	0	5½				
„ of tarsus to point of toe	0	4½				
„ of middle hind-toe	0	1½				
„ of ear	0	6¾				
Breadth of ear in the middle when laid flat	0	3¼				

If this species be not *Lepus ægyptius*, it will have to be named; but I can see no difference whatever, after examining several specimens. It abounds amongst the bushes on the shore plain about Annesley Bay, and is less common near Massowa.

Another closely allied species, with paler fur, probably a variety inhabiting a more desert, sandy country, is *L. isabellinus*, Rüpp., which is identical with *L. æthiopicus* of Hemprich and Ehrenberg.

27. L. tigrensis, W. Blanf.

Ann. and Mag. Nat. Hist. 1869, p. 330.
L. abyssinicus, Lefebvre, Atlas, pl. 5, fig. 1.
L. persimilis, L. saxatili, *sed minor, cauda breviori, plantarum pilis ferrugineis, haud umbrinis.*

Fur above, grey, mottled with black, the hairs grey or pale isabelline at the base, then for a short distance black, succeeded by isabelline grey, more or less pale, the tip being black; towards the sides the black portions gradually die out. Flanks and breast rufescent, chin and belly white; face isabelline, mixed with black—whitish around the eyes; ears of moderate size, dusky brown externally, a fringe of isabelline hairs on the outer edge, and of short, dusky hairs at the tip, inner edge whitish; legs isabelline, mixed with black externally; soles ferrugineous, this colour extending back to the tarsal joint on the hind-legs; tail rather long, white, except a rather broad, dusky, black stripe above.

Unfortunately I did not take the dimensions of this Hare from the animal before skinning; the following measurements being from the dried skin, the length of the body can only be considered approximate. The lengths of the head, ears, and limbs are perfectly trustworthy, however.

	1 in.	2 in.
Length of head from nose to base of ear	4	3·8
„ neck and body from ears to rump (about)	14	13
„ tail 3 in., hairs at end 1 in.	4	4
„ ears	5	5
Breadth of ears	2·8	2·8
Length of radius	4·4	4·5
„ carpus and toes to end of claws . . .	2·3	2·3
„ tibia	5·3	5·2
„ tarsus and toes to end of claws . . .	4·5	4·5
„ skull	3·55	3·45
Breadth of skull at back part of zygomata . . .	1·6	1·6
Height of skull from base of lower jaw to crown of head	2·2	2·15[1]

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[1] 1 from Takonda, No. 287; 2 from Adabagi, 693. The types of this, as of all other species described, are placed in the British Museum.

In the skull of *Lepus saxatilis* the lower jaw is higher in proportion to the length, the zygomatic arch much longer, and the whole skull larger and more powerful.

Lepus tigrensis is a larger and heavier animal than *L. ægyptius*, *L. habessinicus*, *L. sinaiticus*, &c., the limbs being nearly twice as large, and the whole build of the animal more massive. It is an interesting circumstance to find that the common Hare of the Abyssinian highlands approaches more nearly to a South African type than to any of those existing in the surrounding countries, and this affinity is in accordance with the relations of the avi-fauna.

It is not at all surprising that both this Hare and *Lepus ægyptius* from the coast should have been confounded with Hemprich and Ehrenberg's *L. habessinicus.* In few genera are the specific distinctions more difficult to describe than amongst the Hares; and I should not have been satisfied that *Lepus tigrensis* is new, had I not examined Hemprich and Ehrenberg's type. I still cannot help suspecting that there is some error in the locality assigned to the type in question, said to come from near Massowa, or that its remarkably short ears are an individual peculiarity: still, if it be a monstrosity, it certainly belongs to the *Lepus ægyptius*, or a closely allied species, and not to the race inhabiting the Abyssinian highlands. It is rather remarkable that the latter should have been so long overlooked.

Lepus tigrensis abounds around Senafé, Takonda, Adigrat, Adabagi, and Antalo. I did not notice it in the hill country of Lasta. Its habits are precisely those of the European Hare. It was found most commonly on open ground with low scattered bushes, at from 7,000 to 9,000 feet above the sea. I believe that the few hares seen in the Anseba valley, at 4,000 to 5,000 feet elevation, belonged to this species; but I am not certain. They may possibly have been *L. habessinicus,* which, in that case, may inhabit the sub-tropical region, and *L. tigrensis* be confined to the temperate.

28. **Sciurus annulatus,** Desm.

Mammalogie, p. 338.—Gray, Ann. and Mag. Nat. Hist., Ser. 3, vol. xx. p. 329.
Sc. multicolor, Rüpp. Neu. Wirb. p. 38, t. 13.—Brehm, Habesch. p. 62.

I have considered *S. multicolor* as identical with *S. annulatus* on Dr. Gray's authority, as I have not myself been able to examine a sufficiently full series.

I only met with this Squirrel in the thickets on the banks of the Anseba, where it was not very rare in the lofty trees. It is a quiet little animal, less lively than most squirrels.

29. **Xerus rutilus,** Rüpp.

Sciurus rutilus, Rüpp. Atlas, t. 24.
S. xerus brachyotus, Hemp. and Ehr., Symb. Phys., t. ix.
Xerus rutilans, Gray, Ann. and Mag. Nat. Hist., Ser. 3, vol. xx. p. 332.

This Ground-Squirrel, which is figured of much too rufous a colour by Rüppell, is not rare in the lower portions of the passes leading to the highlands. I saw it also in rocky places close to the shore of Annesley Bay. Frequently five or six are seen together keeping to the ground or to rocks, and taking refuge in clefts and holes, never upon trees. The tail is very long and bushy.

30. **X. leuco-umbrinus**, Rüpp.

Rüpp. Neu. Wirb. p. 38, in remarks on the genus *Sciurus*.
X. setosus, Gray, Ann. and Mag. Nat. Hist., Ser. 3, vol. xx. p. 332.

I cannot agree with Dr. Gray in considering the striped Abyssinian Ground-Squirrel identical with the Cape species. Rüppell founded his species on the difference in the ears; the Cape *Xerus setosus* having no external conch, whilst the Abyssinian *X. leuco-umbrinus* has one distinctly developed, although small. On comparing the specimens procured by myself in Abyssinia with those from the Cape in the British Museum, I find this distinction thoroughly confirmed. *X. setosus*, moreover, appears to be a much smaller animal. Specimens of *Xerus* from Western Africa show an intermediate form of ear; they are of the same size as the Abyssinian species, but much darker in colour.

Xerus leuco-umbrinus abounded in rocky places about Senafé and elsewhere, in Tigré up to about 9,000 feet, and I found it as low as 4,500 in the Anseba valley. It has six mammæ. On the 2d of March, near Takonda, I shot a gravid female containing four well-grown young; two, a male and a female, in each horn of the uterus.

31. **Bathyergus splendens**, Rüpp.

Rüppell, Neu. Wirb. p. 36, t. 12.—Brehm, Habesch, p. 63.

This peculiar burrowing rodent is very closely allied in form and habits to the Bamboo Rats (*Rhizomys*) of the Himalaya and Indo-Chinese countries. It burrows in meadows or grassy glades in valleys, throwing up little heaps of earth like molehills at the entrances to its burrows. It appears to live entirely under the earth; and although I several times saw the heaps caused by its excavations, I only obtained specimens of the animal on the borders of Lake Ashangi, where they abounded on the broad grassy plain in which the camp stood.

The burrows are very extensive, and the galleries intricate and much curved. In one which I dug out, there was a larger chamber in the centre about six inches below the surface, well lined with dried roots of grass; from this, burrows led in all directions, usually not more than two or three inches below the surface of the ground, but occasionally rather deeper.

I twice obtained living specimens, one of which I kept for some days, feeding it on roots of grass, which it ate freely, and which I have no doubt are its natural food. In this also there is a close resemblance to *Rhizomys*, which lives on roots of bamboos.

Bathyergus splendens is a sluggish animal, with evidently imperfect sight, and, despite its formidable teeth, it was not difficult to capture, when its underground retreat was cut off. The fur is beautifully fine and soft.

The following dimensions are from a specimen in spirit:—

	in.
Length of head and body	10
„ of tail	3
„ from ear to nose	1·7

	in.
Length of fore leg	2
„ sole of fore foot	1
„ middle toe and claw of fore foot	0·5
Breadth of sole of fore foot	0·45
Length of hind leg	2·5
„ sole of hind foot	1·25
„ longest toe (2d) of hind foot	0·45

32. **Pectinator Spekei**, Blyth.

Blyth, Jour. As. Soc. Bengal, 1855, vol. xxiv. p. 294.
Heugl. Nova Acta Leopoldino-Car. Acad. 1861, p. 1, t. 2.

This very remarkable rodent was first discovered by the late Captain Speke in the Somali country, and is one of the most interesting animals which I obtained. I first procured it on some hills near Hadoda, barely 1,000 feet above the sea, and I found it common in the pass leading to Senafé, at elevations below about 4,000 or 5,000 feet.

It inhabits rocky cliffs precisely as *Hyrax* does, hiding when disturbed in crevices. It is social, several individuals being usually seen about one spot, lying upon ledges of rock or projecting stones. Unless approached cautiously, all hide themselves amongst the stones, emerging again after a time. The spots haunted by these little animals may usually be recognised by the quantity of dried pellets of dung which lie about. These are elongated, and rather larger than those of rats.

The appearance of *Pectinator Spekei* is much that of a small dark grey squirrel with a singularly short tail, which it has a very squirrel-like trick of jerking over its back. It is usually seen lying flat, and is with difficulty distinguished from the rock around. The fur is very woolly and soft, and the skin remarkably thin and tender; so much so, that I never remember experiencing the same amount of difficulty in skinning any other mammal or bird. The skin tears in the fingers like wet tissue paper.

In the stomach I invariably found vegetables alone, much chewed and broken up, so that it was impossible to say what kinds it eats; but evidently its food consists of leaves. I suspect that it feeds at night; I never saw it doing so in the daytime, and far more animals are seen out in the evening than during the day.

The following are the measurements of a male shot at Suru (1), and a female killed near Undul Wells (2), taken on the animal immediately after death:—

	1 in.	2 in.
Length from muzzle to between ears	2	—
„ from muzzle to nape	—	2·5
„ from between ears to rump	5·5	—
„ from nape to rump	—	5·75
„ of tail	2·25	2
„ of hairs beyond end of tail	1·35	1·5
Total length from nose to end of tail hairs, measured along curve of the back . . .	11·10	11·75
Length of fore foot from heel to end of claws .	0·8	0·75
„ middle toe and claw of fore foot . .	0·38	0·45
„ hind foot from heel to end of claws	1·4	1·5
„ middle toe and claw of hind foot .	0·5	0·5
Longest whisker	3	3·5
Height of ear	0·5	0·5
Breadth of ear	0·5	0·5

Diameter of eye-ball, about ¼ inch.

The general colour is greyish brown, with whitish marks over the eyes, and before and behind the base of the ears. Some of the lower moustachial hairs are white.

Some of the specimens of this animal in spirits procured by Mr. Jesse, have been sent to Dr. Peters, who is preparing a complete description of them for the Zoological Society of London.

The figure in the "Nova Acta" gives a very poor idea of this animal, far worse than Blyth's original description. It is much too rufous and pale. Indeed, it differs so much, that I thought I had a distinct species, until I compared my specimens with the original type in the Indian Museum in Calcutta.

33. **Mus abyssinicus**, Rüpp.

Rüpp. Mus. Senck. iii. p. 104, t. vii. f. 1.

This is not a true *Mus*, but apparently no genus has been proposed for the little group to which it belongs. A very similar animal from Mosambique is the type of the genus *Pelomys* of Peters; but the dentition, as pointed out by that naturalist, shows important differences.

Mus abyssinicus was found by Rüppell high on the mountains of Samyen. I met with it abundantly above 10,000 feet on the Wandaj pass, and the Wadela plateau, near Santara. On the lower parts of the plateau, near Esindyé, I did not observe it. It inhabits grassy plains, which are burrowed in all directions by its holes, and the little animals may be seen by dozens running about. It appears peculiar to the subalpine fauna.

34. ? **Mus dembeensis**, Rüpp.

Rüppell, Mus. Senck. iii. p. 109, t. vi. f. 3.

I obtained two specimens of a mouse at Ashangi, which only differ from Rüppell's description and figure in the tail being shorter than the body instead of longer. It may perhaps be distinct.

35. **Mus**, sp.?

Two specimens, Adigrat.

36. **Mus**, sp.

I have been quite unable to identify these two species, but I have not compared them sufficiently to venture to describe them as new.

37. **Dipus gerbillus**, Oliv. (nec *Meriones gerbillus*, Rüpp.).

Oliv. Bull. de la Soc. Philom.—Desmarest, Mamm. p. 321.

Very common close to the coast at Zulla. *Meriones gerbillus* of Rüppell appears to be a much larger species.

CLASS AVES.

ORDER *RAPTORES.*

FAMILY VULTURIDÆ.

1. **Gyps Rueppelli, Bp.**

Vultur Kolbii, Rüpp. Atlas, fig. 32, nec Daudin.
V. Rüppelli, Bp. Rev. and Mag. Zool. 1850, p. 477.—Brehm, Naumannia, 1852, Pt. II. p. 44.
Gyps fulvus, avis adulta, Rüpp. Syst. Uebers., No. 4.
G. magnificus, V. Müll., Descr. Nouv. Ois. d'Afr., Tab. V.
G. Rüppelli, V. Heugl., Ornith. N. O. Africa's, No. 2, p. 5.

The older birds of this species may always be distinguished by the broad silver-grey edgings to the back feathers, and especially to the wing-coverts. So marked is this that some birds have a very handsome mottled appearance, the grey even predominating. I unfortunately could not collect many specimens, and not being aware at the time of the interest attaching to this particular race I did not especially notice its distribution relatively to *Gyps fulvus.* I am, however, of opinion that the great majority at least of the birds which are met with on the Abyssinian highlands belong to the present species. I find a note in my field-book mentioning the great prevalence of mottled individuals on the high plateaux of Wadela and Dalanta. At the same time, *Gyps Rueppelli* is by no means confined to the higher portions of the table-land. I met with it abundantly in the Anseba valley, at 4,000 to 4,500 feet above the sea, and a large number congregated around the carcase of a cow killed by a lion at Rairo, north of the Lebka valley, at an elevation of only 3,000 feet. But from the circumstance that I did not especially notice the conspicuously mottled feathers, I am inclined to suspect that the majority at least of the enormous number of Griffon Vultures which were attracted to the camp at Komayli, at the base of the hills, belonged to *G. fulvus*. At Zoulla, on the shores of Annesley Bay, despite the large number of carcases, Griffon Vultures were not nearly so common as a few miles further inland.

The figure in Rüppell's "Atlas" gives by no means a good idea of this bird; the bill is not yellow, nor the neck flesh-coloured: the former is dusky, the latter dull ashy. Heuglin (Ornith. N. O. Afr.) has described them correctly. The plumage, too, is coloured far too brown by Rüppell.

I frequently saw *Otogyps auricularis*, Daud., but did not preserve a specimen. It is, like its Indian representative, *O. calvus*, Scop., much rarer than other Vultures, two or three occurring amongst a large number of the common species. I met with it on the highlands at a considerable elevation, and I occasionally saw it on the Anseba and at lower levels.

2. **Neophron percnopterus** (Linn.).

Rachamah of Bruce, Travels, vol. v. p. 163, with plate.
Rüpp. Syst. Uebers. No. 2.—Lefebvre, p. 46.—Brehm, Habesch, 2.—Heugl. Ornith. N. O. Africa's, No. 7.

Habits and appearance precisely like those of the Indian variety. Common everywhere from the sea-level up to 10,000 feet, and equally abundant near the camps on the Wadela plateau and on the shores of Annesley Bay.

3. **N. pileatus** (Burchell).

Vultur pileatus, Burch. Trav. S. Afr. ii. 195.[1]
Cathartes monachus, Temm. Pl. col. 222.
Neophron pileatus, Rüpp. Syst. Uebers. No. 3.—Lefebvre, p. 46.—Brehm, Habesch, No. 1.—Heugl. Ornith. N. O. Afr. No. 8.
N. monachus, Ferret et Gall. No. 2, p. 178.

This is a bird of very different habits from *N. percnopterus*, and far more vulturine both in its flight and food. Numbers usually collect around a carcase, which is very rarely, if ever, the case with *N. percnopterus*. The difference is best shown in the fact that both Europeans and Eastern people frequently speak of *N. percnopterus* as a Kite, whilst no one could ever consider *N. pileatus* as anything else than a Vulture. I greatly doubt the propriety of ranking both in one genus.

N. pileatus was the only Vulture common about the camp at Malkatto, on the shores of Annesley Bay. It abounded on the Anseba, and occurred, but less abundantly, on the highlands.

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[1] As all naturalists identify this species with Burchell's description, I suppose there can be no question of its identity; yet Burchell expressly states that his species was equal in size to the largest African vultures, and, in the description, adds, "Species inter majores."

FAMILY FALCONIDÆ.

4. Falco barbarus, L.

Salvin, Ibis, 1859, p. 184, pl. 6.—Heug. Orn. N. O. Afr. No. 11.
F. peregrinoides, Rüpp. Syst. Uebers. No. 25.

I shot a single female specimen of a Falcon in the Anseba valley, which appeared to me too large for this species, and Mr. J. H. Gurney, to whom I submitted it, agreed with me at first in considering it a specimen of *F. minor*, Bon. It is a comparatively young bird, just changing the brown immature plumage for the greyer livery of the adult. The wing measures nearly 13 inches,[1] tail 6·5, tarsus 2, middle toe without claw 2. The length of the wing in *Falco barbarus* is given by Mr. Salvin ("Ibis," vol. i. p. 189) as 11 to 11·25 inches (specimens supposed to be females); by Von Heuglin ("Orn. N. O. Africa's," p. 22) as 10″ 4‴ to 10″ 6‴ (French measure) in the male, and 11″ 6‴ to 11″ 9‴ in the female (about 11 and 12⅓ inches English respectively); whilst that of *F. minor* is given by Layard ("Birds of South Africa," p. 19) as 12¼ in the male, 13 in the female. The tail, however, is much longer in *F. minor*, 8 to 8¾ inches according to Layard; and Mr. Gurney, on comparing the Abyssinian specimen with a fully adult female *F. barbarus*, from North Africa, finds that there is no important difference in size.

The chin and the upper part of the breast are white, the lower breast and abdomen strongly rufous, with rather close imperfect black transverse bars; chin-stripe very much developed, and a tendency to a rufous collar at the back of the neck.

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[1] In both wings the longest feather is slightly imperfect at the end, the absolute length being 12½ inches.

5. **F. tanypterus**, Licht.

Tinnunculus biarmicus, Schleg. Abhand. t. 12, 13.—Rüpp. Syst Uebers. No. 30.
Falco biarmicus, Ferret et Gallinier, No. 4.—Lefebvre, p. 67.
F. cervicalis, Heugl. Syst. Uebers. No. 44.—Brehm, Habesch, No. 12.
F. lanarius nubicus, Heugl. Orn. N. O. Afr. No. 12, p. 23.

The common Falcon, I believe, of the Abyssinian highlands. I shot three specimens on the plateau; one at 10,500 feet, on the top of the Wandash saddle, another at Dongolo, a third at Adigrat. This bird was also frequently met with in the Anseba and Lebka valleys.

	in.		in.
In the male from Wandash the wing measures .	13·5 ;	tail,	7·5.
In a female from the Lebka river „ .	15	„	8.

The latter specimen is very rufous beneath, with very few black marks.

6. **F. sacer**, auct. (? Gm.)[1]

Gould's Birds of Asia, pt. xx.—Schlegel, Traité de Fauconnerie, pl. 5.
F. saqer, Heugl. Orn. N. O. Afr. No. 13.

Iris brown; orbit, cere, and nearly the whole beak bluish grey, tip of bill dusky; legs pale greenish grey.

I killed a single specimen at Kelamet in the Lebka valley, nearly 3,000 feet above the sea. I saw a pair chased by crows (*Corvus scapulatus*), and succeeded in shooting one. It has a remarkably pale head, whitish isabelline with dusky streaks, is dusky brown above, and dusky with broad pale edges to the feathers beneath, darker on the body and lighter on the head than in Schlegel's figure. The wing measures 14 inches, tail nearly 8.

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[1] I greatly doubt if this be the *Falco sacer* of Gmelin.

I saw a very similar specimen at Lahej, near Aden, which was shot by a friend. Persian and Afghan specimens, Dr. Jerdon informs me, have darker heads.

7. F. (*Tinnunculus*) tinnunculus, Linn.

Ferret et Gall. No. 6.—Hengl. Orn. N. O. Afr. No. 21.
Tinnunculus alaudarius, Rüpp. Syst. Uebers. No. 27.
Lefebvre, p. 68.

Common both in the highlands and lowlands in the winter and spring. The bird abounded on the former as late as April. None were observed in the Anseba valley in July and August.

A very dark-coloured female from Adigrat shot on the 23d April is, Mr. Gurney informs me, similar to the race inhabiting Madeira. Von Heuglin states that the birds which breed in Northern Africa are more deeply coloured than those which migrate.

8. F. (*Tinnunculus*) cenchris, Naum.

Heugl. Orn. N. O. Afr. No. 23.
Tinnunculus cenchris, Rüpp. Syst. Uebers. No. 28.

Not rare on the Abyssinian highlands.

9. **Melierax polyzonus**, Rüpp.

Falco (Nisus) *polyzonus*, Rüpp. Neu. Wirb. p. 36, taf. 15, fig. 1.
Melierax polyzonus, Rüpp. Syst. Uebers. No. 43.
Nisus polyzonus, Fer. et Gall. No. 7.
Melierax musicus, Lefebvre, p. 70.
Astur polyzonus, Heugl. Orn. N. O. Afr. No. 39.

It is darkish brown, orbit dull yellow, cere and legs bright orange, claws dusky, base of bill orange, passing into flesh colour, tip dusky.

Common on the sea-coast and in Habab up to about 3,000 feet elevation, but not seen in the Anseba valley, or at any high elevation, and appears chiefly restricted to the tropical zone. Heuglin, however, states that he has met with it at greater heights. It is usually seen perched on a tree, less frequently on the ground, its food being reptiles and insects. Its flight is very buzzard-like and not swift, and it generally settles again after flying a short distance.

10. **Nisus tachiro**, Daud.

Falco tachiro, Daud. Traité Comp. d'Ornith. ii. 90.
F. (Astur) *unduliventer*, Rüpp. Neu. Wirb. p. 40, t. 18, fig. 1.
Nisus unduliventer, Rüpp. Syst. Uebers. No. 42.—Heugl. Orn. N. O. Afr. No. 43.

Iris yellow; skin round eyes, cere, gape, and legs also bright yellow. Both M. Jules Verreaux and Mr. Gurney, two of the best authorities on South African Raptores, consider the only specimen which I obtained of this bird as identical with *N. tachiro.* My single skin is that of a very old male in superb plumage. All the upper parts are dusky with a slaty tinge, tail dusky black, all the feathers except the outermost with four white bands, the anterior of which is concealed by the coverts, and a narrow white tip, quills obsoletely banded with dusky above, distinctly with white, especially on the inner webs, below. All the under parts closely banded with ferruginous, except the throat, where the stripes are grey, the under tail-coverts, which are pure white with only traces of bands, and the thigh-coverts, which are pure ferruginous. I can, however, detect slight traces of banding even on these. The measurements are,—whole length about 15 inches, wing 7·8, tail 6·5, tarsus 2·4. There is a specimen of *N. tachiro* from South Africa in the British Museum, which agrees well with that from Abyssinia in colouring.

I only once met with this bird, which must be very rare in Abyssinia, as both Rüppell and Von Heuglin seem also to have obtained it only on one occasion each, the latter procuring three specimens. I found a pair at Goona Goona, near Senafé, in the middle of March, evidently breeding, chasing each other through bushes beneath a small waterfall, but I only succeeded in shooting the male.

11. **Nisus** (*Micronisus*) **niloticus**, Sund.

Melierax gabar, Rüpp. Syst. Uebers. No. 44.
M. niloticus, Sundevall, Ofvers. K. Vet. Akad. Forh. 1850, p. 132.
Nisus gabar, Heugl. Orn. N. O. Afr. No. 46.

Iris dull red; cere and legs orange; bill dusky.

I shot a pair of these birds at Ailat, west of Massowa. They appear to me to differ conspicuously from the southern species *N. gabar*, Daud. in the less amount of grey on the breast, and the much fewer transverse bands on the abdomen. The tail also appears slightly shorter. The following are the measurements of the two specimens, both apparently females:—

		in.		in.
1.	Wing,	7·75;	tail,	6·6.
2.	„	7·8	„	6·8.

The somewhat shorter tail is the character upon which Sundevall grounds his distinction of the species.[1] Mr. Gurney, who kindly examined one of my specimens, considers it distinct. Von Heuglin also appears inclined to separate the northern race.

12. **N.** (*Micronisus*) **niger,** Vieill.

Sparvius niger, Vieill. Enc. p. 1269.
Circus maurus, Rüpp. Syst. Uebers. No. 47; teste Heugl. sed?
Nisus niger, Heugl. Orn. N. O. Afr. No. 47.

Iris brown; cere and bill black; legs yellow with black patches in front, and also above the toes; nails black.

I shot two males together in jungle near the source of the Lebka. Both had been feeding on either birds or small mammals, not on insects.

By some authors this is considered a mere melanism of *N. gabar*. It appears to me to differ from the northern race, *N. niloticus*, in smaller size and in the markings on the underside of the quills being larger and less numerous. The quills themselves also appear rather different in shape. The dimensions are, wing

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[1] Sundevall says certainly "*M. gabar ex Sennaaria a Caffro differt cauda multo longiore fere gradata*," but his measurements show that it is the northern or Sennaar form which has the shorter tail.

6·75 in., tail 5·5, but the tail-feathers appear to be not quite fully grown.

13. N. (*Micronisus*) sphenurus, Rüpp.

Falco (*Nisus*) *sphenurus*, Rüpp. Neu. Wirb. p. 42.
Accipiter brachydactylus, Swains. B. West Afr. vol. i. p. 118.
Nisus sphenurus, Rüpp. Syst. Uebers. No. 41, p. 6, t. 2.
Micronisus guttatus, Heugl. Journ. f. Ornith. 1861, p. 430.
Nisus badius, Heugl. Orn. N. O. Afr. No. 45.

Iris yellow, or greenish yellow in young, orange or scarlet in old birds; cere yellow; legs dark yellow; bill black. In young birds the breast is spotted, in adults banded, the changes precisely as in *N. badius* (Cf. Jerdon, B. Ind. vol. i. p. 48).

When I saw this bird in Abyssinia, it always appeared to me very much smaller than the common Indian Shikra (*N. badius*, Gm.), and the measurements appear to bear out this view, although Schlegel and Von Heuglin unite the two races. The following are measurements of three specimens of *N. sphenurus*:—

	Length. in.	Wing. in.	Tail. in.	Tarsus. in.
Old female	12	7·4	6·5	1·7
Young female	12·75	7·5	6·2	1·7
Young male	11	7	5·3	1·6

These agree very fairly with Rüppell's and Von Heuglin's measurements. But the measurements of the Indian *N. badius*, according to Jerdon, are:—

	Length. in.	Wing. in.	Tail. in.	Tarsus. in.
Female	14 to 15	8¼	7	nearly 2
Male	12½	7½	5½	

N. sphenurus was extremely abundant amongst Tamarisk trees at Mohabar and elsewhere in the Lebka valley, and far from rare in the Anseba. Birds in the young plumage were more numerous than adults. All at Mohabar were living on *Cicadæ*, and so far as my observations extended, this bird is very much more insectivorous than its Indian representative.

Mr. Gurney informs me that the West African *N. brachydactylus* of Swainson is identical with *N. sphenurus*.

14. **Aquila rapax**, Temm.

Falco rapax, Temm. Pl. col. 422 (a very rufous specimen).
Aquila albicans, Rüpp. Neu. Wirb. p. 34, t. 13, figs. 1 and 2.—Ferret et Gallinier, No. 9.—Des Murs, p. 65.
A. rapax, Rüpp. Syst. Uebers. No. 15.—Heugl. Syst. Uebers. Nos 16, 18, 19, 20 (partly under MS. names).—Brehm, Habesch, Nos. 7 and 8.—Heugl. Orn. N. O. Afr. No. 45.
A. nævioides, Cuv.

Iris yellowish brown, or yellowish grey much mottled with brown; gape, cere, and legs yellow; claws black; bill dusky.

A somewhat larger and much more powerful bird, with conspicuously stronger beak and legs, than the closely allied Indian *A. fulvescens* of Gray. The plumage varies from umber brown to rufous, the latter colour prevailing in adult birds, especially on the head and upper part of the back. Old birds are whitish (*A. albicans*, Rüpp.).

This bird is common everywhere in Abyssinia; I obtained specimens both on the highlands and in the low plains of Samhar close to the coast. I shot one sitting on a small rocky hill in the latter in August. It breeds on the highlands about January. I saw one nest on the top of an isolated tree near a village, containing a young bird almost full-grown, on March 24th. Several of these

Eagles frequently collected about carcases in company with Vultures, *Neophrons*, and Crows.

I add measurements of two specimens:—

	Wing. in.	Tail. in.	Bill to Gape. in.	Tarsus. in.	Middle toe without claw. in.
1. Male (Senafé, Tigré) .	20·3	11	2·5	3·4	2·3
2. Female ? (Amba, near Massowa, Samhar)	21	11	2·4	3·5	2·4

15. Helotarsus ecaudatus, Daud.

Falco ecaudatus, Daud. Traité Comp. d'Ornith. ii. 54.
Helotarsus ecaudatus et leuconotus, Rüpp. Syst. Uebers. 23, 23*a*.—Lefebvre, p. 66.—Atlas, pl. 2 (jun.).—Heugl. Syst. Uebers. 35 and 36.—Brehm, Habesch, No. 10.—Heugl. Orn. N. O. Afr. No. 50.

Iris brown; cere (large) and lores Indian red, with some yellow around and above the nostrils; bill deep yellow; tip dusky; legs mottled pale Indian red and yellow, claws dusky.

By no means a common bird in Abyssinia: I only killed one which was flying over me, in the Anseba valley. Mr. Jesse shot a second on the ground near our camp. Another specimen, which was shot at Mayen, was given to me by Captain Sturt of the Transport Train. I occasionally saw birds of this species, especially about Senafé, soaring at a great height, their pointed wings and extremely short tail rendering them no less conspicuous than the contrast between the white underside of the wings and the black body. The flight is superb, more like that of a vulture than of an eagle, as the head sweeps along with motionless wings, occasionally high up in the air, but more frequently at about 150 to 200 feet above the ground. I never saw it near the coast.

16. **Buteo augur**, Rüpp.

Abyssinian white-breasted Lanner. Salt, App. p. xlii.
Falco (Buteo) augur et hydrophilus, Rüpp. Neu. Wirb. p. 38, t. 16, 17.
Buteo augur, Rüpp. Syst. Uebers. No. 10.—Ferret et Gall. No. 11. —Brehm, Habesch, No. 6.—Heugl. Orn. N. O. Afr. No. 59.

Iris yellowish brown ; cere and legs yellow.

This very handsome Buzzard appears to belong to the temperate and subalpine fauna of Abyssinia. It is very rarely met with below 6,000 to 7,000 feet, and I never saw it on the Anseba or in the passes below Senafé. At the higher elevations its numbers increase greatly, and it abounds on the Wadela plateau at 10,500 feet.

It is more often seen perched on the ground than on trees, and rarely flies to any distance when disturbed. A female shot at the end of February had the ovaries greatly enlarged and was evidently breeding, but I did not see the nest. It is by no means a wary bird.

I am rather of opinion with Rüppell that the dark-coloured birds are young and not a melanoid variety. I shot two black specimens ; one evidently immature, the other apparently a bird of the year.

17. **Gypogeranus serpentarius**, Gm.

Falco serpentarius, Gm. Syst. Nat. i. 250.
Serpentarius reptilivorus, Rüpp. Syst. Uebers. No. 49.—Des Murs p. 70.
S. typicus, Ferret et Gall. No. 16.
Gypogeranus serpentarius, Heugl. Orn. N. O. Afr. No. 49.

Iris grey ; legs yellowish.

A rare bird on the Abyssinian highlands: I only saw it twice, and obtained one specimen. In the stomach were locusts and lizards; the latter, of which there were at least a dozen, were all scinques of two species, *Gongylus ocellatus* and *Euprepeis quinquetæniatus.*

The pace at which the Secretary bird can walk is astonishing. The bird above mentioned, after being wounded, walked away as fast as I could run after it.

18. **Gypaetos meridionalis,** Keys and Blas.

Nisser or Golden Eagle, Bruce, vol. v. p. 155; Nisser Werk on plate.
African Bearded Vulture, Salt, App. p. xli.
G. meridionalis, Keys and Blas. Wirb. Europas, p. xxvii.—Rüpp. Syst. Uebers. No. 1, t. 1.—Ferret et Gall. No. 1.
G. barbatus, Des Murs, p. 43.
G. barbatus meridionalis, Heugl. Orn. N. O. Afr. No. 9.

Iris whitish yellow, outer circle of opaque scarlet, feet pale olive.

The Abyssinian Lammergeyer was occasionally but not frequently seen at the base of the hills. It was more common in the passes, and abundant on the highlands, especially at all camps in the neighbourhood of crags. In the summer months perhaps all keep to the highlands, as none were seen on the Anseba in July or August.

Abundant as these birds were around Senafé and other places, I never saw them descend on carcases like Vultures, but they appeared to search for small fragments of offal, &c. around the camp; and when so doing, their whole habits and flight precisely resemble those of a Kite. Indeed, so great is the resemblance of this bird to a Kite, that I cannot help suspecting that its affinities are with the *Falconidæ* near the *Milvinæ*, and not with the Vultures. The appearance when standing on the ground is certainly somewhat like that of *Neophron percnopterus*, but this bird is itself a very aberrant member of the *Vulturidæ*. The flight of the Lammergeyer is very fine, equalling that of a Vulture.[1] It keeps much to precipices.

Some authors consider the Abyssinian Lammergeyer as only a variety of the Alpine and Himalayan one. Yet the differences between the two birds are very considerable. *Gypaetos meridionalis*, in addition to its naked tarsi and deeper coloration, is very much smaller than the European and Asiatic race, as the following measurements of two birds shot at Senafé show. The dimensions were taken in the flesh :—

	Young female.		Old male.	
	ft.	in.	ft.	in.
Length	3	7	3	3
Extent of wings	8	0	7	4
Length of closed wing	2	5	2	3
" tarsus	0	4½	—	
" middle toe	0	4½	—	
" beak to gape	0	4	—	

The European Lammergeyer is 4¼ ft. long, and has an extent of 10 ft. according to Naumann. In the Himalayan bird the male measures 46 in. in length, 9 ft. in extent; the female 4 ft. in length and 9½ in. in extent (Jerdon, "Birds of India," p. 14).

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[1] Few, who have not been in the habit of seeing Vultures, can easily conceive what noble birds they are when on the wing. The sluggish, slovenly, ugly scavenger becomes at once a different being, with the most graceful and powerful flight. The manner in which they can fly around crags, keeping themselves in swift motion apparently for an indefinite time, rising, falling, or soaring in circles without moving their wings or tail, except to guide themselves, is simply marvellous.

Bruce's account of the Abyssinian bird is very amusing. He records a singular act, the seizure of some goat's flesh from his servants by a Lammergeyer.

19. Milvus migrans, Bodd.

M. ater, Rüpp. Syst. Uebers. No. 37, *partim.*—Ferret et Gallinier. No. 13.—Lefebvre, p. 69.
M. ætolius (!) Heugl. Orn. N. O. Afr. No. 64.

Extremely common everywhere, both on the highlands and lowlands. As I brought several specimens with me from various localities, I have certainly not mistaken *M. ægyptius* for this bird. Von Heuglin is decidedly in error in supposing it to be only a winter visitant in North-eastern Africa. He appears to doubt its occurrence in Abyssinia. A similar circumstance occurred to me to that quoted in the Zoological portion of Lefebvre's "Voyage en Abyssinie." I was skinning a specimen of *Scopus umbretta* at Lat when a Kite swooped and attempted to carry it off, scoring my fingers in the attempt.

20. M. ægyptius, Gm.

Falco ægyptius, Gmelin, Syst. Nat. i. 261.
F. Forskahlii, Ibid. p. 263.
F. parasiticus, Latham.
? *Milvus ater*, Rüpp. Syst. Uebers. No. 37, *partim.*
M. parasiticus, Heugl. Syst. Uebers. No. 60.—Brehm, Habesch, No. 14.
M. Forskali, Heugl. Orn. N. O. Afr. No. 65.

Iris brown; bill and legs yellow.

This appeared to me much less common than the preceding. I did not distinguish the two when in

Abyssinia, and the only specimen I preserved of this Kite was killed on the highlands at Lake Ashangi. Heuglin must be under some error in treating of this as the only common Kite of North-eastern Africa. Certainly so far as my specimens prove, ***M. ater*** was more abundant in Abyssinia; and unquestionably it was the common species both at Zulla and Senafé, as I shot several specimens at each locality. I take the first name in Gmelin, and do not understand why the German ornithologists prefer the less well-known term *M. Forskali.*

21. **Circus æruginosus,** Linn.

C. rufus, Rüpp. Syst. Uebers. No. 45.—Heugl. Syst. Uebers. No. 72.
C. æruginosus, Heugl. Orn. N. O. Afr. No. 68.

Occasionally seen on the highlands. I never met with it in the peculiar adult livery of the Indian race.

22. **C. Swainsoni,** A. Smith.

S. Af. Quart. Journ. i. 384, 1830.—S. Af. Zool. plates 43, 44.—Heugl. Orn. N. O. Afr. No. 71.
C. pallidus, Sykes, P. Z. S. 1832, p. 80.
Strigiceps pallidus, Brehm, Habesch, No. 17.

23. **C. cineraceus** (Mont.).

C. cinerascens, Heugl. Orn. N. O. Afr. No. 70.

Both these species abounded on the highlands in the winter and spring. I shot a young male of *C. cineraceus* on the 19th August close to the coast in Samhar, about twenty-five miles north of Massowa. This is early for a Harrier to be found so far south, but they migrate into India sooner than most of the winter visitants.

FAMILY STRIGIDÆ.

24. Bubo lacteus, Temm.

Strix lactea, Temm. Pl. col. 4.
Bubo lacteus, Rüpp. Syst. Uebers. No. 53.—Heugl. Orn. N. O. Afr. No. 79.
B. cinerascens, Brehm, Habesch, No. 19.

Iris pale brown; beak, cere, and feet very pale horn-colour, almost whitish; claws rather darker.

This bird I did not meet with on the highlands. A specimen was shot by Captain Sturt, in the pass below Senafé, and I obtained two in the Anseba valley and saw others. They perch on high trees during the day, and come out at dusk.

Despite their large size, these Owls are very insectivorous. In the stomachs of those killed I found only Crickets or Locusts and large larvæ, apparently of coleoptera. According to Von Heuglin ("Orn. N. O. Afr." p. 114), *Bubo lacteus* kills small mammals and birds and even Guinea-fowls, which it attacks at night when roosting on trees!

25. Bubo cinerascens, Guér.

Guérin, Rev. Zool. 1843, p. 321.
B. cineraceus, Ferret et Gall. Voyage iii. 181; Atlas, pl. 2.
Otus cineraceus, Lefeb. p. 74; Atlas, pl. iv.
Bubo maculosus (? Brehm, Habesch, No. 20).—Heugl. Orn. N. O. Afr. No. 80.

Iris brown.

I only once met with this bird. Lieutenant St. John noticed that a pair of Owls inhabited a rocky cliff near

Antalo, and on going to the spot I was fortunate enough to secure one, as both flew at the sound of shot fired at a Hyrax. The skin is that of a female, and measures, whole length 18¾ in., wing 13½, tail 7, tarsus 2¼.

Both Mr. J. H. Gurney and Mons. Jules Verreaux consider the present species quite distinct from *Bubo maculosus* of South Africa. Mr. Gurney informs me that he has seen both species alive, and that the distinction is generic.

26. **Athene perlata**, Vieill.

A. pusilla, Rüpp. Syst. Uebers. No. 51.—Ferret et Gall. No. 20.
A. occipitalis, et pusilla, Heugl. Syst. Uebers. No. 81 and 82.
Noctua perlata, Heugl. Orn. N. O. Afr. No. 85.

Iris yellow.

This little Owl was first seen and a specimen shot at Mayen in the Senafé pass, at about 3,500 feet. It was not rare on the Anseba. I only saw it amongst trees. It is somewhat diurnal in its habits, and is not unfrequently seen flying from tree to tree in the evening, some time before sunset. In the stomach of one specimen I found remains of lizards.

27. **Scops senegalensis**, Swainson.

Birds W. Afr. i. 127.
Scops zorca africana, Heugl. Orn. N. O. Afr. No. 82*a*.

Occasionally heard and seen in the Anseba valley. I found coleoptera in the stomach.

ORDER *PSITTACI.*

FAMILY PSITTACIDÆ.

28. Pionus Meyeri, Rüpp.

Psittacus Meyeri, Rüpp. Atlas, p. 18, Taf. 11.—Lefeb. p. 128.
Pionus Meyeri, Rüpp. Syst. Uebers. No. 330.—Ferret et Gall. No. 24.
Pionius Meyeri, Finsch, Papageien, ii. 494.

Iris pale orange, greenish near the pupil; legs and cere dusky, beak blackish. Usually met with in July and August in small parties of three to six individuals, less often in larger flocks. The cry is far less shrill than that of *Palæornis.*

This bird was never seen on the highlands. It was abundant near Kokai, in the upper Lebka valley, and somewhat less so on the Anseba. It was not seen much below 4,000 feet of elevation.

Most birds have more or less yellow on the crown, the amount however varying. Rüppell's figure is that of a bird without any. This is far from uncommon, but still it is rather an exception. I could not find out whether the difference is due to age.

29. Psittacula Tarantæ, Stanley.

Psittacus Taranta, Stanley, Salt's Travels, Append. p. lii.—Lefeb p. 128.
Psittacula Tarantæ, Rüpp. Syst. Uebers. No. 334.—Ferret et Gall. No. 26.—Finsch, Papageien, ii. 634.

The male alone has a red head.

This bird was never seen below 7,000 feet above the sea, and appeared to be very locally distributed, abounding chiefly about Kolqual and Dahro trees in pairs and small parties. It was especially common near Adigrat. My collector obtained in April an egg, which he assured me belonged to this bird, from a hole in a tree, and there can be little doubt of its having been correctly identified.

30. **Palæornis torquatus** (Bodd.).

P. cubicularis, Hasselquist.—Rüpp. Syst. Uebers. No. 335.—Ferret et Gal. No. 27.
Psittacus torquatus, Lefebvre, p. 128.
Palæornis torquatus, Brehm, Habesch, No. 110.—Finsch, Papageien, ii. 17.

Never seen by me on highlands, but tolerably common in the Anseba valley at an elevation of from 4,000 to 5,000 feet. The birds obtained by me had longer bills than any of the Indian specimens which I compared with them, but Dr. Finsch, from the comparison of a large series of African and Asiatic specimens, has decided that there is no constant difference between the two races.

ORDER *INSESSORES.*

SUB-ORDER PICÆ.

FAMILY PICIDÆ.

31. **Picus** (*Campethera*) **nubicus**, Gm.

Gmelin, Syst. Nat. p. 439.
P. æthiopicus, Hempr and Ehr., Symb. Phys., note.
Dendromus æthiopicus, Rüpp. Syst. Uebers. p. 90, t. 36.

Beak dusky, paler beneath. Legs greenish horny. Iris in the young bird pearl grey, in the adult pink. The young bird has the head unspotted black; in the adult it is spotted as in Rüppell's figure. In one instance I killed three birds out of four which were together, and doubtless belonged to one family. Of these, two had the crown spotted, one having a grey, the other a pink iris; the third had the crown unspotted and a grey iris.

This Woodpecker was only met with between 3,000 and 6,000 feet above the sea in the pass leading to Senafé, and again, to the north, in the Lebka and Anseba valleys. I never saw any Woodpecker on the highlands. In July, on the Anseba, this was the only species seen. It was abundant in the thickets along the banks of the stream. The stomach in some birds which I shot was filled with the ova of insects.

32. Picus (*Dendrobates*) Hemprichii, Ehr.

Picus Hemprichii, Ehrenberg, Symb. Phys.
Dendrobates Hemprichii, Rüpp. Syst. Uebers. p. 88, t. 35.
Picus abyssinicus, Ferret et Gal. No. 40.
P. Hemprichii, Lefebvre, p. 135.
Dendropicus Hemprichii, Brehm, Habesch, No. 113.

This bird keeps to a lower level than the last species, but is certainly rare, and in the hot season, I think, entirely wanting in the plains near the sea, where however Brehm records having met with it in the month of April.[1] I met with it near Undul Wells, in the pass below Senafé, and again in the Lebka valley at an elevation of from about 3,000 to 4,000 feet.

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[1] At the time of the spring rains many birds appear to migrate from the mountains to the plains of Samhar, which are not found there at other times.

Family INDICATORIDÆ

33. Indicator Sparrmanni, Steph.

(?) Moroc or Bee Cuckoo, Bruce's Travels, App. p. 178.
Indicator Sparrmanni, Steph., Shaw's Zoology, Birds, ix. 138.
I. albirostris, Temm. Pl. col. 367.—Ferret et Gal. No. 33.—Lefebvre, p. 139.
I. flaviscapulatus, Rüpp. Neu. Wirb. p. 60.
I. archipelagicus, Rüpp. Syst. Uebers. No. 349.—Heugl. Syst. Uebers. No. 491.
I. pallidirostris, Heugl. Journ. f. Orn. 1864, p. 265.

Bill white, iris brown.

I am indebted for a specimen of this rare species to Mr. Jesse, who killed it on the Anseba, and, on one occasion, actually shot a specimen calling upon a tree in which was a Bees' nest.

The bird is a male, and measures, wing 4·4, tail 3·25, whole length about 7 inches.

34. I. minor, Steph.

Stephens, Shaw's Zoology, ix. p. 140.
I. diadematus, Rüpp. Neu. Wirb. p. 61.
I. minor, Rüpp. Syst. Uebers. No. 350.—Brehm, Habesch, No. 114.
? *I. major*, Lefebvre, p. 138.

Iris brown, beak and legs dusky, nostrils subtubular with raised margins as in cuckoos.

I shot two specimens of this bird in the thickets on the banks of the Anseba, where, however, it appeared to be far from common. In one instance the *Indicator* was in the act of chasing and fighting with a Woodpecker, *Picus æthiopicus ;* neither bird, however, uttering any noise. The *Indicator*, when it settled, clung to a stem like a Woodpecker, but I did not see it climb in the same way.

The stomach is not muscular but quite thin, and in both specimens of this species, as well as in those of *I. Sparrmanni*, filled with a mass of wax, from which, however, all the scent of honey was gone. In one instance, at least, fragments of hymenopterous insects in considerable quantities were mixed with the wax: they looked, however, more like portions of ants than of bees. There can apparently be no doubt that both species of *Indicator* feed on honey and attack Bees' nests, probably feeding also on the Bees themselves. The native stories of their leading people to Bees' nests are well known, but in Northern Abyssinia at least it is asserted that these birds do not always conduct the honey-seeker to the same goal. At times, it is said, they lead to a dead body; at others to a Lion or a Leopard. Tales told of animals by uncivilized races must, however, in all cases be received with great caution; and in the instance of a race like the Abyssinians, who are not hunters in general, imagination probably plays a far more important part than observation, precisely as amongst all the races of India, except the few whose life is spent to a great extent in hunting for wild animals and forest products for food. That by observing and following an *Indicator* Bees' nests may be found is easily understood, and it is not necessary to conclude that the bird shows the road intentionally.

The sternum of *Indicator* does not much resemble that of a Cuckoo. It is more like that of a Woodpecker, but still more similar to that of a Barbet or a Coly. There is a deep double notch at each side behind, the two portions separated by an oblique rib, the inner being the deeper. The whole bone is long and flat, and rather narrow, becoming gradually broader behind; the ridge low with a straight edge. Judging from the sternum, I should certainly be disposed to place *Indicator* with the Barbets or Colies rather than with the Cuckoos. It is evidently a bird of weak flight.

It is not clear to what bird Bruce refers under the name of the Moroc or Bee Cuckoo. His figure resembles *Oxylophus* or *Chrysococcyx;* and if, as he states, it is of the natural size, it should be the latter: but the description of the colouring by no means accords, and agrees rather with that of *Indicator Sparrmanni,* though differing in several particulars, some of which must certainly be erroneous—such as the statement that it has only three toes. He relates concerning it the usual stories told of *Indicator;* which, however, he treats as fables: his own account of the habits seems to agree best with those of a *Merops.* It is by no means improbable that the drawing was made from *Oxylophus glandarius* or *O. jacobinus,* and the description drawn up from memory.

FAMILY CAPITONIDÆ.

35. **Pogonorhynchus abyssinicus (Latham).**

Phytotoma abyssinica, Latham, Ind. Orn. Supp. xlix.
Bucco Saltii, Stanley, Salt's Journey, Appendix, p. liv.
Pogonias Brucei, Rüpp. Neu. Wirb. p. 50, t. 20, fig. 1.
Laimodon Brucei, Rüpp. Syst. Uebers. No. 338.
Pogonias gnisso balito, Bruce? Ferret et Gal. No. 38.
P. rubrifrons, Lefebvre, p. 128.
Pogonias Saltii, Brehm, Habesch, No. 111.

I obtained one specimen of this bird close to the camp at Dongolo, on Dahro (*Ficus dahero*), but I never saw it on the higher portions of the plateau above 7,000 feet. In July pairs were occasionally seen on high trees making a great noise and probably engaged in breeding.

36. **P. undatus**, Rüpp.

Pogonias undatus, Rüpp. Neu. Wirb. p. 52, t. 20, fig. 2.—Ferret et Gal. No. 36.
Laimodon undatus, Rüpp. Syst. Uebers. No. 338.—Heugl. Syst. Uebers. No. 477.
Bucco undatus, Lefebvre, p. 130.
B. undulatus, Des Murs et Prévost, Lefebvre, Atlas, pl. 10, fig. 2.

Iris pale greyish yellow, bill black, legs dusky. Not rare about Adigrat and Senafé.

Close to the shrine of St. Romanos I shot a specimen which was hanging head downwards from a branch, feeding upon fruit.

37. **P. melanocephalus**, Rüpp.

Pogonias melanocephalus, Rüpp. Atlas, p. 41, t. 28, fig. *a*.
Bucco bifrenatus, Hemp. and Ehr., Symb. Phys., t. viii. figs. 1, 2.
Laimodon melanocephalus, Rüpp. Syst. Uebers. No. 336.

Iris brown, beak and legs black.

Only seen in the neighbourhood of the coast. I obtained one specimen at Komayli and two others near Ailat. Apparently the three species of *Pogonorhynchus* are thus to a certain extent characteristic of the three lower subdivisions of the Abyssinian fauna; *P. melanocephalus* being met with in the tropical, *P. Saltii* in the subtropical, and *P. undatus* in the temperate region.

In the stomach of *P. melanocephalus* were many coleoptera. All the Abyssinian Barbets appear much more insectivorous than their Indian representatives. The same is the case with the Hornbills.

38. **Barbatula pusilla,** Dumont.

Bucco pusillus, Dum., Dict. des Sc. Nat. iv. p. 50.
B. chrysocomus, Rüpp. Syst. Uebers. No. 341.
B. chrysocomus, Ferret et Gal. No. 35.

This bird was only met with in the subtropical region. It was far from rare about Mayen in the Senafé pass, and common on the Anseba. It has a peculiar simple note, recalling that of the well-known "Coppersmith" of India (*Megalæma indica*), but rather less metallic and differently uttered; for while the call of the latter is single with regular brief intervals, and repeated thus for a considerable time, that of the former is double or treble followed by a pause.

Von Heuglin describes another species, *B. uropygialis*, from the Anseba, and states that he found it common there. It is evidently not the same as that which Mr. Jesse and I obtained, for it has the back sulphur yellow in the centre and the rump orange, besides many other distinctions.

39. **Trachyphonus margaritatus** (Rüpp.).

Bucco margaritatus, Rüpp. Atlas, t. 20.
Tamatia erythropygos, Hemp. and Ehr., Symb. Phys., t. vii.
Trachyphonus margaritatus, Rüpp. Syst. Uebers. No. 342.—Brehm Habesch, No. 112.
Micropogon margaritatus, Ferret et Gal. No. 34.
M. margaritaceus, Lefebvre, p. 132.

Iris brownish grey, bill pale reddish brown, legs greenish horny.

Common from the sea-coast to about 3,000 feet in the Senafé pass, and very abundant on the Anseba. I believe that I heard it at about 7,000 feet on the highlands, but

I never heard or saw it above that elevation. It is insectivorous to a considerable extent.

Its note is quite different from that of the typical Barbets, being a rapid repetition of two notes, and so similar to that of the common grey Francolin of India, *F.* (*Ortygiornis*) *pondicerianus*, that for a long time I supposed it to be the call of a Partridge. In June, July, and August it was constantly heard. This Barbet keeps much to thick low bushes.

FAMILY CUCULIDÆ.

40. **Cuculus canorus**, L.

I heard a Cuckoo on the 17th May at Agula, about half-way between Adigrat and Antalo. This, however, scarcely proves that the bird breeds in Abyssinia, for I have heard the woods resounding with the well-known note in the centre of India, near Sironcha on the Godavery, at the same season. In the Anseba valley Cuckoos made their appearance at the end of July, but they were not then calling. I shot one, a male and apparently a young bird, on the 4th August.

41. **Oxylophus afer** (Leach).

Cuculus afer, Leach, Zool. Misc. i. p. 72.
C. edolio, Levaill. var. Salt, No. 12, App. p. xlvi.
O. ater, Rüpp. Syst. Uebers. No. 355.
O. Levaillantii, Ferr. et Gal. No. 29.

Iris brown, bill black, legs dusky grey.

This bird was occasionally seen, and four specimens in beautiful plumage shot, in the Upper Lebka and the Anseba valleys in July. They were then evidently breeding, being in pairs and very noisy; and a hen shot on the 11th of July contained an egg fully matured and ready for laying. It was bluish green in colour.

The usual cry is a harsh chatter quickly repeated, not unlike a Woodpecker's. The bird has also a liquid cuculine note. When sitting on a branch it often raises its crest, which when raised looks as if it were double.

Measurements of a male:—Whole length 15 inches, wing 7, tail 8·75, crest 1·5.

42. **O. jacobinus** (Bodd.).

O. melanoleucos, Gmelin.
O. serratus, Heugl. Syst. Uebers. No. 500.

Very rare in the Anseba valley, and not seen elsewhere. I shot a single male specimen, and Mr. Jesse obtained another. I can see no distinction between the bird I killed and a series of Indian specimens with which I compared it.

The specimen shot measures:—Whole length 12·5 in., wing 5·75, tail 7, crest 1·3.

43. **Chrysococcyx cupreus** (Bodd.).

Cuculus auratus, Gmelin.
Chrysococcyx auratus, Rüpp. Syst. Uebers. No. 359.—Heugl. Syst. Uebers. No. 505.

Iris and orbit scarlet, bill dusky above, pale horny beneath, legs dusky.

Rather scarce in the Anseba valley; no specimens of the genus seen by me on the highlands. Found amongst bushes, not being shy. It was probably breeding in July, for on one occasion two were found sitting together; and both in that instance and a previous one the birds were singing most musically, the note being the sweetest and most varied I ever heard from a Cuckoo. The bird's position when singing is peculiar; it stoops on the branch and partly spreads its wings. In the stomach of one specimen examined were various insects, including ants; caterpillars and other larvæ predominating. Wing 4 ft. 6 in., tail 3·4 in.

44. **C. Klaasi** (Cuv.).

Vieill. Enc. Meth. p. 1333.—Rüpp. Syst. Uebers. No. 357.

Iris brown, orbit very pale green, beak dusky, legs pale brownish olive.

Only a single specimen obtained, which was shot on a bush in the Lebka valley at about 4,000 ft. elevation. It is a male, and immature, having rufous bands on the feathers. Wing 3·7 in., tail 2·7 in.

45. **Centropus monachus**, Rüpp.

Neu. Wirb. p. 57, t. 21, fig. 2.—Syst. Uebers. No. 352.—Ferr. et Gal. No. 30.
C. senegalensis, Salt, No. 13, App. p. xlvi.

Iris red.

This bird is peculiar to the highlands, and was never noticed much below 7,000 feet, nor above 8,500. Its range may be greater, but it is probably confined to the temperate region. It was met with in thick bushes, often on the banks of streams, and with the skulking, hiding habits of the genus, making its way upon the ground through thick bush. The flight and habits are very similar to those of the well-known "Crow Pheasant" of India (*C. rufipennis*). Its cry also is similar, very quickly uttered—who-who-who-who-wăwăwăwăwă. A male measures :—Whole length 15·5 inches, wing 7, tail 9, length of hind claw 0·8.

46. C. superciliosus, Rüpp.

Rüpp. Neu. Wirb. p. 56, t. 21, fig. 1 ; Syst. Uebers. No. 353.—Ferr. et Gal. No. 31.—Brehm, Habesch, No. 115.

Iris deep blood-red, legs bluish grey, bill black.

I first shot this bird at Ailat; it was abundant at Ain on the Lebka, and occurred occasionally in the Anseba valley. It was never seen in Abyssinia proper. The habits are similar to those of *C. monachus*, but the cry seemed to me rather different, somewhat resembling the coo of a dove uttered shortly, and quickly repeated several times.

Several German naturalists, amongst whom are Drs. Hartlaub and Finsch, consider this bird the young of *C. monachus*. This is certainly an error, and one into which no naturalist acquainted with the birds in the wild state could have fallen. Both species were founded on fully adult specimens, and not only are they quite different in plumage, but their habitat is entirely distinct, *C. monachus* being only found in the temperate region of Abyssinia, while *C. superciliosus* is equally confined to the tropical and subtropical parts of the country. I saw numerous specimens of both and shot several. The measurements of *C. superciliosus* are :—

	Whole length. in.	Wing. in.	Tail. in.	Hind claw. in.
Male	14·75	6·8	8	0·85
Female	14·75	6·2	8·2	0·65

Family MUSOPHAGIDÆ.

47. Turacus leucotis (Rüpp.).

Corythaix leucotis, Rüpp. Neu. Wirb. p. 8, t. 3.
Turacus leucotis, Rüpp. Syst. Uebers. No. 326.—Ferr. et Gal. No. 45.

Iris brown, bill scarlet, with a green patch at the base above the nostrils, legs dusky. Around the eye is a ring of small coral-red papillæ, a few of the uppermost larger than the rest and paler in colour.

This lovely bird abounds in the subtropical and is often met with in the temperate region up to 8,000 feet: I never saw it below 4,000 feet. It was common in the passes from Undul Wells nearly to Senafé. It also abounded in the Anseba valley. It keeps much to high trees, but can climb well and quickly amongst rocks. It is very often seen on junipers—indeed I scarcely ever saw it in the temperate region away from them; and in March I found it and most other fruit-eating birds, such as *Amydrus* and *Pycnonotus*, feeding upon the berries.

48. Chizaerhis zonura (Rüpp.).

Rüpp. Neu. Wirb. p. 9, t. 4; Syst. Uebers. No. 327.

Iris olive brown, beak greenish yellow.

This dull-coloured Plantain-eater is very rare in all parts of the Abyssinian highlands traversed by the army. I only once saw it there: this was in the thickly wooded valley of Meshek, south of Antalo. I was surprised at hearing a peculiar harsh cry quite unknown to me, and on looking up saw the bird on a branch just above my head.

In the Upper Lebka and Anseba valleys this *Chizaerhis* abounds, and its excessively loud harsh call is constantly heard. Like other Plantain-eaters, it appears to live solely on fruit. It keeps mostly to high trees.

FAMILY COLIIDÆ.

49. Colius leucotis, Rüpp.

Mus. Senckenberg. vol. iii. t. 2, fig. 1; Syst. Uebers. No. 319.—Ferr. et Gal. No. 48.

C. striatus, Salt, No. 44, App. p. xlviii.

C. leuconotus, Brehm, Habesch, p. 219, No. 103.

Iris greyish blue (pale cobalt), legs dull carmine, resembling those of a pigeon in colour, greater portion of upper mandible and base of lower dusky, centre of upper and greater portion of lower flesh-coloured.

Inhabits the temperate region of Abyssinia, occasionally descending to about 4,000 or 5,000 feet above the sea. It lives in small flocks (? families), which keep much in thick bushes and feed on fruit. They fly from bush to bush with a moderately rapid, very straight flight, and evidently have no great power of wing, the different individuals following each other in the manner of *Crateropi* or *Malacocerci*, which they also somewhat resemble in their flight—so much so, that I took the first flocks I saw for some very long-tailed members of the *Crateropidæ*.

I saw this bird frequently in Tigré, and a few specimens occurred in the Anseba valley; but it was less abundant there than the next species. On July 16th I found a nest with two very young birds. It was a small flat platform of sticks in a thorny bush.

The toes of *Colius* are very different from those in other Scansorial Insessores, and even from those of the Plantain-eaters. Both the outer toes are reversible to a certain extent, but the third toe appears very rarely to be reversed, and even the fourth is quite as frequently turned forward as backwards.

As a species *Colius leucotis* is barely separable from the South African *C. striatus*, Gm. The whitish ear-coverts are often ill-marked; and although the general tinge in the Abyssinian bird is slightly more rufous, the difference is very trifling. The principal distinctions are, that the wing in *C. leucotis* is about ⅓-inch and the tail 1 inch longer than in *C. striatus*, that the former is more distinctly striated at the back of the neck than the latter, and that it has the rump also transversely striated with rufous lines, which is not the case in *C. striatus*. Also in *C. leucotis* the crest is situated further back, and the earthy-brown feathers of the forehead occupy a larger space than in *C. striatus*. The feet in the latter, too, appear to be dark brown.

50. Colius macrourus, L.

C. senegalensis, Gm. Syst. Nat. p. 842.—Rüpp. Syst. Uebers. No. 318.—Ferr. et Gal. No. 47.—Lefebvre, p. 122.

Iris crimson inside, violet passing to greyish without. Naked skin around the eyes and the lores deep red. Legs purplish red. Upper mandible red, except the tip, which is black, as is the whole of the lower mandible. In young birds the iris is brown, bill greenish yellow with the tip whitish, skin around the eyes dusky; the blue feathers of the nape and the long tail are both wanting.

This bird appears to range from about 2,000 feet or even lower to 5,000 or 6,000 feet, entirely replacing the last species in the tropical, and to a great extent in the subtropical zone. Its habits are precisely similar to those of *C. leucotis.*

FAMILY CORACIADÆ.

51. Coracias abyssinica, Bodd.

Sherigrig of Bruce, vol. v. p. 182, with plate.
C. abyssinicus, Gm.—Lefebvre, p. 79.—Rüpp. Syst. Uebers. No. 84.—Brehm, Habesch, No. 31.
C. habessinicus, Heugl. Journ. f. Orn. 1868, p. 319, et Orn. N.O. Afr. No. 134.

Iris raw umber. The habits are precisely similar to those of *C. indica.* It is frequently seen sitting on trees, or on bare stems, and thence descending to the ground for insects or catching them in the air.

This bird is not rare locally on the highlands, but by no means generally distributed. I saw it occasionally between Dolo and Antalo, and again rather more commonly about Lake Ashangi (8,000 feet above the sea), and in some of the valleys further south, but not on the plateaux. It was very common in the subtropical region of the Anseba and Lebka, and I saw one or two birds, in August, in Samhar, near the coast. It is also found in Southern Arabia, and birds are occasionally seen on the Red Sea.

52. Coracias pilosa, Lath.

Latham, Ind. Ornith. Supp. p. xxxii.
C. nuchalis, Swainson, B. of W. Afr. p. 110.—Ferr. et Gal. iii. p. 238.
C. Levaillantii, Rüpp. Syst. Uebers. No. 85.
C. pilosa, Heugl. Journ. f. Orn. 1868, p. 320, et Orn. N. O. Afr. No. 133.

Iris olivaceous brown (almost raw sienna), feet pale yellowish olive, bill black externally, inside of mouth yellowish olive like the feet.

This bird is very much rarer than the last on the highlands. I only saw it twice, and failed to procure a specimen. It abounded in the subtropical region of the Anseba.

53. Eurystomus afer (Lath.).

Coracias afra, Lath. Ind. Orn. p. 172.
Eurystomus orientalis, Rüpp. Syst. Uebers. No. 82.
Eurystomus afer, Heugl. Journ. f. Orn. 1868, p. 322, et Orn. N. O. Afr. No. 131.

Iris olivaceous, legs pale yellowish olive, bill deep yellow. A noisy bird with a swift hawk-like flight, with all the usual habits of a Roller, but keeping rather more to high trees than the two other species, and perhaps rather more given to "rolling" from side to side when flying. It often hawks locusts and other insects in the air.

E. afer was only met with in the subtropical region of the Upper Lebka and Anseba valleys. It there abounded, in company with the other two Rollers.

FAMILY MEROPIDÆ.

54. Merops viridissimus, Swains.

Swainson, B. of W. Afr., ii. p. 82.—Lefebvre, p. 83.
M. viridis, Rüpp. Syst. Uebers. No. 97.

Common near the coast, and especially in the mangroves on the shores of Annesley Bay.

This bird, like the closely allied *M. viridis* of India, has the habit of collecting in considerable numbers and of settling on the ground occasionally.

55. ?M. apiaster, L.

Rüpp. Syst. Uebers. No. 96.—Ferr. et Gal. No. 162.—Lefebvre, p. 83.—Brehm, Habesch, No. 33.

Rare on the highlands in spring. Not seen elsewhere.

56. M. superciliosus, L.

Rüpp. Syst. Uebers. No. 96.
M. ægyptius et *M. persicus*, auct.

I am indebted for a single specimen shot at Adigrat to Captain Newport. I did not myself meet with this bird.

Compared with a specimen from Madagascar, the typical locality, the wing is ⅝ in. longer. The central tail-feathers are also longer; but this is a character varying with the season.

57. M. nubicus, Gm.

Gm. Syst. Nat. i. 464.—Ferr. et Gal. No. 163.—Lefebvre, p. 83.
M. cæruleocephalus, Lath.—Rüpp. Syst. Uebers. No. 98.

This fine Bee-eater I only saw once. A large number were collected about one spot close to the hot spring of Atzfut on the shores of Annesley Bay. Mr. Jesse also met with it only once and in the same neighbourhood.

58. M. albicollis, Vieill.

Vieill. Nouv. Dict. d'Hist. Nat. xiv. p. 15, et Enc. Meth. p. 393.
M. Cuvieri, Licht. Verz. d. Doubl. p. 13.—Lefebvre, p. 83.

Iris crimson. In December, January, and February this bird was not found in the coast region, but with some other species it migrated into the country in the spring, and abounded throughout Samhar in June and July. I saw it as far inland as Rairo in Habab, but it appeared to be restricted to the tropical dry coast region.

M. albicollis usually keeps to trees, but I have seen it settle on the ground, in company with *M. viridissimus.*

59. M. Lafresnayii, Guér.

? *M. erythropterus*, ? large variety. Salt, No. 19, App. p. xlvi.—Guér. Rev. Zool. 1843, p. 322.—Ferr. et Gal. Voy. iii. p. 243; Atlas, pl. 15.—Brehm, Habesch, No. 35.
M. variegatus, Rüpp. Syst. Uebers. No. 100.
M. Lefebvrii, Desm. et Prev.—Lefebvre, Voyage en Abyssinie, Zool. p. 83; Atlas, pl. 5.

Iris crimson, legs brown, bill black. A common bird in the passes from 3,000 ft. upwards, and often seen on the highlands, especially after March.

In the Anseba Valley this bird was replaced by the next species.

60. M. erythropterus, Gm.

Gm. Syst. Nat. i. p. 464.—Salt, No. 16, App. p. xlvi.—Rüpp. Syst. Uebers. No. 99.—Lefebvre, p. 83.

Common in the Anseba Valley in July. I unfortunately only took a single specimen, for the birds were moulting, and I mistook them at the time for specimens of *M. Lafresnayii* in bad plumage.

FAMILY HALCYONIDÆ.

61. Halcyon semicærulea (Forsk.).

Forsk. Descr. Animalium, 1775, p. 2.—Rüpp. Neu. Wirb. p. 68 t. 24, fig. 1, et Syst. Uebers. No. 87.—Ferr. et Gal. No. 166.
Dacelo semicærulea, Heugl. Orn. N. O. Afr. No. 147.

Iris brown, bill and legs scarlet. A purely insectivorous bird, rarely seen near water, and occasionally found in dry portions of the jungle. It occurred about Ailat and Ain at the base of the hills, and was also seen in the Anseba valley.

Hartlaub (Syst. Ornith. West-Afrika's) separates Swainson's *Halcyon rufiventer* (B. of W. Afriea, ii. p. 101) from this species; but my specimens agree very well with Swainson's figure and description.

62. **H. senegalensis** (Linn.).

Ferr. et Gall. No. 171.
H. cancrophaga, Heugl. Syst. Uebers. No. 129 (nec. Lath.).
Dacelo senegalensis, Heugl. Orn. N. O. Afr. No. 148.

Iris brown, upper mandible red, lower mandible black, legs purplish black, soles of feet salmon colour. This is also an insectivorous species. It was only met with on the Anseba, where it occurred, far from commonly, in the thickets along the bank of the stream. It was, however, never seen sitting beside the water, nor were there any fish in the torrent which could have attracted it, and the stomach in all the specimens killed contained insects only. This bird has a very loud shrill cry, quickly repeated, not unlike the alarm-note of a Woodpecker.

Apparently this Kingfisher migrated into the Anseba valley about the latter end of July, as it was not seen there before.

63. **Ispidina picta** (Bodd.).

Alcedo cærulea, Kuhl.—Rüpp. Neu. Wirb. p. 70, et Syst. Uebers. No. 93.
Ispidina cyanotis, Brehm, Habesch, No. 32.
I. picta, Sharpe, Alcedinidæ, pt. iv.
Alcedo picta, Heugl. Ornith. N. O. Afr. No. 143.

Iris brown, bill and legs scarlet. In the young bird the beak is black with a yellowish tip, and the legs pale orange.

This species also is insectivorous. It was not very unfrequent in the Anseba valley, keeping to the thickets, and often sitting in the densest bushes. It was not seen elsewhere.

A young bird, which had apparently only just left the nest, was shot on July 30th. A few days later, in the evening, a pair of adult birds were observed keeping about one spot, as if they had a nest there. The nest, however, could not be found. The spot was in rather thick bushes near a small ravine.

64. Corythornis cyanostigma (Rüpp.).

Alcedo cyanostigma, Rüpp. Neu. Wirb. p. 70, fig. 24, f. 2, et Syst. Uebers. No. 92.—Ferr. et Gal. No. 170.

C. cristata, Sharpe, Alcedinidæ, part vi.—Heugl. Orn. N. O. Afr. Nos. 140 and 142.

Iris brown, legs and bill coral-red. Only seen on the highlands, but not much above 7,000 feet. It was most common near Agula and Dongolo, but was nowhere abundant.

The habits of this bird are entirely different from those of the previous species. It is a fish-eater, and was never seen away from the streams, on the banks of which it might be observed resting on a branch over the water, and thence dashing down upon fish, or skimming rapidly up or down the stream precisely like *Alcedo ispida.*

A. cyanostigma of Rüppell was founded on a young specimen. The adult has always been looked upon as the true *A. cristata*, L., and the two have been separated by most ornithologists. I learn from Mr. Sharpe that since publishing the description of this species in his "Alcedinidæ," he has become convinced that the true *A. cristata* of Linnæus is the Madagascar species, and that the African form must bear Rüppell's name. This is to be regretted, as the name is objectionable.

65. Alcedo semitorquata, Swains.

Swains. Zool. Ill. t. 151.—Rüpp. Syst. Uebers. p. 20, t. 7.—Sharpe Alcedinidæ, pt. v.—Heugl. Orn. N. O. Afr. No. 139.

I am indebted to Captain Newport of the Commissariat department for the only specimen of this bird which I saw in Abyssinia. This was killed at Adigrat on the highlands of Tigré.

66. Ceryle rudis, L.

Rüpp. Syst. Uebers. No. 89.—Lefebvre, p. 80.—Ferr. et Gal. No. 168.—Heugl. Ornith. N. O. Afr. No. 144.

This also was a rare bird in the country traversed, doubtless in consequence of the few large streams. I saw it on the Jedda river near Magdala, and again near Dongolo, at about 7,000 ft. above the sea, which I suspect to be a higher elevation than this Kingfisher usually affects. I shot one specimen at the latter place. It differs considerably from all Indian specimens with which I have compared it, in the much less amount of black on the breast and the larger quantity on the sides of the abdomen. It has also a much shorter bill; but this is a variable character in Kingfishers. Mr. R. B. Sharpe, however, considers that there is no constant difference between African and Asiatic birds, both varying much.

FAMILY BUCEROTIDÆ.

67. Toccus Hemprichii, Ehr.

Tockus Hemprichii, Ehr.
Buceros (*Lophoceros*) *Hemprichii*, Ehr., Symb. Phys., Aves, 1828.
B. limbatus, Rüpp. Neu. Wirb. p. 5, t. 2, fig. 1, 1835.
Tockus limbatus, Rüpp. Syst. Uebers. No. 325.—Ferr. et Gal. No. 43.—Brehm, Habesch, No. 107.

Iris yellow brown, clouded with darker colour near the pupil, bill dull red, legs dusky.

A highland species, but by no means very common in the country traversed. It was most frequently seen around Senafé in small flocks, probably families, of about four to eight birds. I occasionally met with it in the higher parts of the Anseba valley, keeping to the hills. On the Wadela plateau, near Bethor, I saw what appeared to me a darker variety, or distinct race; but I had not the means of procuring a specimen at the time.

The measurements of a female are:—Wing 11·4 in. tail 10·5; bill, nostril to point 4·1, gape to point 4·7; height of bill 1·4; tarsus 1·3: whole length about 23 in.

By Brehm, "Reise nach Habesch," p. 219, and by Hartlaub, "Syst. der Orn. West Afr." p. 164, *Buceros Hemprichii* of Ehrenberg is considered a synonym of *B. nasutus*, Hartlaub especially calling it the female. This is evidently a mistake, the female of *B. nasutus* being the *B. hemileucos* of the "Symbolæ Physicæ." Ehrenberg's descriptions are not very good, but the characters of the bills alone serve to show what the birds really are to which they refer.

It is also as well to call attention to the fact that the subgeneric names, *Alophius* proposed by Ehrenberg in the "Symbolæ Physicæ" for *Buceros erythrorhynchus*, and *Lophoceros* for *B. nasutus* and *B. Hemprichii*, have priority over Lesson's genus *Tockus* proposed for *B. erythrorhynchus* and its allies in 1831 (Less. "Traité d'Ornithologie," p. 252).

68. **T. flavirostris** (Rüpp.).

Buceros flavirostris, Rüpp. Neu. Wirb. p. 6, t. ii. f. 2.—Ferr. et Gal. No. 42.
Yellow-billed Hornbill, Latham, Gen. Hist. Birds, ii. 331.
Tockus flavirostris, Rüpp. Syst. Uebers. No. 224.

Iris pale yellow, pupil small, bill orange yellow, gape dusky, legs dusky. The note is a harsh cluck several times repeated, especially when the bird is disturbed.

In January and February this Hornbill was abundant in the pass leading to the highlands from about 2,500 to 5,000 feet above the sea. It was usually in small flocks. In May and June all had migrated to higher ground, and were met with, often singly, about Senafé at 7,000 and 8,000 feet.

Like its allies, *T. flavirostris* is partly insectivorous. In the stomach I found beetles, ants, and seeds. It often feeds on the ground. All the Abyssinian *Tocci*, like the Barbets, appear much more insectivorous than their Indian representatives. The bill varies greatly in size in the two sexes, as it also does in the next two species. The measurements are :—

	Wing.	Tail.	Bill from nostril to tip.	Bill from gape.	Height of bill across nostril.
	in.	in.	n.	in.	in.
Male	8	9	2·9	3·3	1·35
Female . . .	7·3	8·7	2·2	2·8	1·15

69. T. erythrorhynchus (Temm.).

Buceros erythrorhynchus, Temm. Pl. Col. ii. p. 59.—Ferr. et Gal. No. 41.

Buceros (*Alophius*) *erythrorhynchus*, var. *leucopareus*, Hemp. and Ehr., Symb. Phys.

Tockus erythrorhynchus, Rüpp. Syst. Uebers. No. 322.—Brehm, Habesch, No. 108.

Iris brown, skin in front of the eye pale yellow, bill dull red, base of lower mandible dusky beneath, legs dusky.

Except the colour of the iris and bill, and the shape of the latter, there is very little to distinguish this Hornbill from the last. *T. erythrorhynchus*, however, inhabits a lower zone of elevation in general than its congener. The two occurred together about Mayen (3,500 feet) in the Senafé pass, in January and February, but *T. erythrorhynchus* was also found in Samhar in July and August. It was also common throughout the Lebka valley and on the Anseba, but I never saw it on the highlands.

In July and August these birds were very lively. Their call is something like "whoot-whoot-whoot-whoot-whoot-tawut-tawut-tawut-tawut-tawut," increasing in intensity and rapidity and rising in the scale towards the end. Measurements:—

	Wing.	Tail.	Bill, nostril to tip.	Bill, gape to tip.	Height of bill across nostril.
	in.	in.	in.	in.	in.
Male	7·4	9	3·15	3·8	1
Female	7·2	8·7	2·45	3·1	0·95

70. T. nasutus, L.

Buceros nasutus, Linn. Syst. Nat. 12th ed. i. p. 154.
Tockus nasutus, Rüpp. Syst. Uebers. No. 323.—Brehm, Habesch, No. 106.
Buceros (*Lophoceros*) *Forskalii*, Hemp. and Ehr. (male); *B.* (*Lophoceros*) *hemileucos*, Hemp. and Ehr. (female), Symb. Phys.
Tockus pœcilorhynchus, Lafresnaye (female), Rev. Zool. 1839, p. 257.

Iris brown, legs dusky, soles and interstices between the scales pale. The bill differs greatly in the two sexes. In the male it is much larger and black, except one spot below the nostril: in the female the upper mandible is yellowish white towards the base, except around the nostrils, where it is dusky; the lower mandible dusky near the base, with one or two diagonal pale streaks; both mandibles reddish brown towards the tip.

Not very common about Komayli, at the foot of the hills, in February; much more frequent in the Lebka valley in July, and not rare in the Anseba.

Like the others, this bird is often seen on the ground,[1] and is highly insectivorous; coleoptera, ants, and seeds being found in the stomach. Amongst the coleoptera in one instance were several of a species of *Molurus*. At another time I saw a bird of this species fly after and capture a locust in the air. The Hornbill was not very skilful in hawking, and the locust eluded him at first, bu was soon caught.

It is not quite clear that this species is not distinguishable from that of South Africa. If so, it must bear Ehrenberg's name, *B. Forskali.* The dimensions are:—

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[1] Brehm's observations on the Abyssinian Hornbills are opposed to mine. He says they rarely descend to the ground, that they feed on fruits, and that the voice of different species is similar ("Reise nach Habesch," p. 357). I examined the stomachs in numerous instances.

	Wing.	Tail.	Bill, nostril to tip.	Bill, gape to tip.	Height of bill across nostril.
	in.	in.	in.	in.	in.
Male	8·7	8·4	3·3	3·9	1·2
Female	7·5	7·1	2·5	3·4	1·05

71. Bucorvus abyssinicus (Gm.).

Buceros abyssinicus, Gmel. Syst. Nat. i. p. 358.
Abbagumba and Erkoom, Bruce, Travels, vol. v. p. 169, with plate.
Tragopan abyssinicus, Rüpp. Syst. Uebers. No. 320.
Bucorax abyssinicus, Brehm, Habesch, No. 109.

Iris brown, legs dusky, bill and casque black. In the female the skin of the neck is purple, in the male bright red, in part at least, and at all seasons; but I believe the extent of the red differs in different individuals, perhaps with age, and it may be absent in the young.

The Abbagumba is one of the most extraordinary birds of Africa. Belonging to a family essentially constituted for perching and climbing, it has the legs modified so as to enable it to seek its food entirely on the ground. To any one accustomed to the Hornbills of India and Malayasia it is as startling to see one of the family stalking over the ground in an open plain, as it would be to find plovers feeding in trees.

I paid some attention to the habits and food of this curious bird. It is almost entirely insectivorous; in every case in which I examined the stomach the contents were principally large beetles and locusts. In one instance I found remains of scorpions and some large spiders; in another there were fragments of bones, apparently of a tortoise. They were not in a state to give any indication as to whether the animal had been killed and eaten by the Hornbill, or whether its remains had been found and swallowed after death. I once saw an Abbagumba near a number of mule carcases, but not, so far as I could see, feeding on them. I think in all probability it was attracted by the insects.

During the day the Abbagumba is generally seen, often in pairs or three together, on open plains. At night they roost upon trees. Their flight is heavy and somewhat noisy; not nearly so much so, however, as that of the great Indian Hornbill, *Buceros bicornis*, L., which may be heard at an immense distance. I have occasionally seen *B. abyssinicus* on trees in the day, but it does not frequently remain upon them.

Their voice is very deep and sonorous. They have two principal notes; one, only uttered, so far as I heard, on the ground, is something like "hŭm-hŭm," the first note higher in the scale and longer than the second. The other is a peculiar booming sound, so much resembling the rather distant roar of a Lion, that on the Anseba, where both Lions and Ground Hornbills are common, it was some time before I could distinguish the two. This noise was made both on the ground and on trees, and is frequently heard in the evening.

Bucorvus abyssinicus is chiefly found from about 4,000 feet to 7,000 or 8,000, but it is occasionally met with at lower elevations, and I once saw a bird at Komaylī.

FAMILY UPUPIDÆ.

72. Upupa epops, L.

Rüpp. Syst. Uebers. No. 102.
U. minor, Lefebvre, p. 86.
U. senegalensis, (?) Ferr. et Gal. No. 161.—Brehm, Habesch, No. 37

Generally distributed. I shot one specimen, a female, in July in the Anseba valley, and saw others; so some must remain throughout the summer. It is just possible that these may belong to Swainson's *U. senegalensis*, and may be a distinguishable non-migratory race; but the differences appear to me of no importance.

73. Irrisor erythrorhynchus (Lath.).

Upupa erythrorhynchos, Lath., Gen. Syn., Supp. pl. 110.
? do. variety with a black tail, Salt, No. 22, App. p. xlvi.
Promerops erythrorhynchus, Rüpp. Syst. Uebers. No. 103.—Ferr. et Gal. No. 158.
P. senegalensis, Cuv. apud Blyth, Report on Zool. Coll. from Somali Country, Journ. As. Soc. Bengal, 1855, p. 299.

Iris dark brown, legs pink, rather dull. The bill is sometimes red throughout, at others entirely black; more frequently partly one colour, partly the other: it is considerably longer (about ½ in.) in the male than in the female. These birds have a very peculiar and rather unpleasant odour. They are met with in small flocks, which are very noisy, and hunt for their food, small insects, about the trunks and branches of trees. After hunting for some time about one tree, they fly, often singly, one after the other, to another, keeping up a great chattering.

I found *Irrisor erythrorhynchus* most common in the Anseba valley, and it appears chiefly to belong to the subtropical and the warmer portion of the temperate region, being occasionally seen on the highlands around Senafé, &c., wherever there are many trees. I also saw it, and shot one bird, in the tropical region at Ailat.

The sternum has a much lower keel than that of *Upupa*, which it otherwise resembles. There is a single moderate notch in the hinder edge.

By comparison I have ascertained that the bird from the Somali country in the Calcutta Museum, named *Prom. senegalensis* by Mr. Blyth, and which he considered distinct from the Cape *I. erythrorhynchus*, is a young female with a short bill and less metallic gloss on the feathers. I obtained precisely similar specimens myself. In some specimens from South Africa I find the white spots on the primaries quite as well developed as in those from Abyssinia. The colour of the bill varies—red, black, or the two colours mixed in every conceivable proportion.

The following are dimensions of five specimens :—

	Wing.	Tail.	Whole length. about	Bill from nostril.
	in.	in.	in.	in.
1. Male from Senafé . . .	5·9	8·8	16·5	1·8
2. „ Anseba . . .	5·6	8·5	15	1·9
3. Female from Anseba . .	5·4	8·6	14·75	1·3
4. „ „ . .	5·45	8·2	14·8	1·25
5. „ Ailat . . .	5·3	imperfect	—	1·25

The last is immature and in dusky plumage, almost without iridescent colour.

I presume Salt refers to this bird, and that the black tail attributed to it is a mistake for black beak. Of course he is in error in stating that they feed on the fruits of *Ficus*: it is the insects in the fruits.

74. I. (*Rhinopomastes*) **aterrimus** (Steph.).

Promerops aterrimus, Steph. Shaw's Gen. Zool., Aves, xiv. 257.
P. pusillus, Swains. B. West Afr. ii. p. 120.
P. cyanomelas, Rüpp. Syst. Uebers. No. 104.—Ferr. et Gal. No. 159.

Iris brown, bill black, gape yellow, legs black.

A silent bird, only seen solitary, and apparently not associating in flocks like *I. erythrorhynchus.* It was met with rarely in the Anseba valley amongst thick bushes and trees. Dimensions:

	Wing.	Tail.	Whole length about	Bill from nostril to tip.
	in.	in.	in.	in.
Male	4·3	5·8	10	1
Female	3·8	5·3	8·75	0·85

The latter is in duller plumage, and is perhaps immature.

FAMILY CYPSELIDÆ.

75. Cypselus æquatorialis, Müll.

Müller, Naum. 1851, iv. p. 27.—Id. Desc. de nouv. Ois. d'Afr. tab. vii.—Sclater, P. Z. S. 1865, p. 598.
C. Rüppelli, Heugl. Syst. Uebers. No. 106 (without descr.); Orn. N. O. Afr. p. 141, No. 102.
C. melba, Lefebvre, p. 77.—Heugl. Orn. N. O. Afr. p. 140.

This bird was not rare around Senafé in February and March, and I am inclined to believe, from having seen the birds late in the evening and early in the morning flying round the cliffs of the trachyte hills (known in the army as Senafé rocks) west of the camp, that they roosted there. In May they had disappeared; at least I could see none. Their flight is very similar to that of *C. melba*, and I think equally swift. I only shot two specimens. The measurements of one of these, a female, are :—Whole length 8·5 in.; wing 7·6; tail, outer feather 3·4, middle feathers 3; bill, point to gape nearly 1.

Von Heuglin's attempt to substitute his name *C. Rüppelli*, published without any description in his "Syst· Uebers." in the *Sitzungsberichte der mathem.-natürw. Classe der Kais. Akad. der Wissenschaften* (Vienna) for 1856, and only described in Cabanis' "Journal für Ornithologie" for 1861, for Von Müller's name *C. æquatorialis*, published with a description in the *Naumannia* for 1851, and figured in Von Müller's "Description des nouveaux Oiseaux d'Afrique," published in 1853, deserves especial notice and reprobation. The excuse given in Von Heuglin's note, "Ornith. N. O. Afr." p. 142, that the name *C. æquatorialis* cannot be retained because the species has not yet been observed south of 14° north lat., is scarcely valid.

76. **C. apus,** L.

Rüpp. Syst. Uebers. No. 68.—Ferr. et Gal. No. 153.—Heugl. Orn. N. O. Afr. No. 103.

This bird was not noticed on the highlands. In the Anseba valley many appeared at the end of July, none being seen before the 25th. Some of the specimens shot had pale edgings to the feathers, and were evidently young birds; others were of uniform colour.

77. **C. affinis,** Gray and Hardwicke.

Ill. Ind. Zool. pl. 35, fig. 2.—Sclater, P. Z. S. 1865, p. 604.
C. abyssinicus, Streubel, Isis, 1848, p. 354.
C. galilæensis, Antinori.
C. affinis, Heugl. Orn. N. O. Afr. No. 146.

Only met with at the base of the hills and for a short distance within the pass. In May many were breeding under rocks in the Suru pass. Brehm states that this bird breeds on palms. Of course he has confounded its nidification with that of another group of Swifts, to which belong *C. batassiensis*, Gray, of India, and *C. parvus*, Licht. of Africa.

FAMILY CAPRIMULGIDÆ.

78. **Caprimulgus nubicus,** Licht.

Dubl. Cat. p. 59.
C. infuscatus, Rüpp. Atlas, t. 6, p. 9.—Syst. Uebers. No. 61.
C. tamaricis, Tristram, Ibis, 1866, p. 75, pl. ii.
C. nubicus, Heugl. Orn. N. O. Afr. No. 92.

I obtained a single specimen of a Nightjar near Zulla, which may perhaps belong to this species, as it agrees in measurements and in most of the characters with Rüppell's description. It differs in colour from the plate, being much greyer, but in the case of other species figured in Rüppell's Atlas the coloration is not always quite accurate. Rüppell only mentions a white band on the three outer primaries. In the bird from Zulla the four first primaries are banded, the band being imperfect on the first. The measurements are: Wing 5·6 in., tail 4, tarsus 0·8, whole length about 8·75.

I think there can scarcely be a doubt but that my bird is also identical with *C. tamaricis*, Tristram. That ornithologist has doubtless been misled by Rüppell's very poorly executed plate. It also agrees with Lichtenstein's description.

There are two white spots on the throat.

79. C. inornatus, Heugl.

Heugl. Orn. N. O. Afr. No. 94, p. 129.

Common at Ain, Mohabar, and Kokai in the Lebka valley; I also shot one specimen at Komayli. At Kokai many of these Goatsuckers, together with Kites, Rollers, and other insectivorous birds, were attracted by a swarm of winged termites issuing from their nest. Measurements:—

	Wing. in.	Tail. in.	Tarsus. in.
Male	6	4·7	0·6
Female	6	4·6	0·7

80. C. tristigma, Rüpp.

Syst. Uebers. p. 14, t. 3.—Ferr. et Gal. No. 151.—Brehm, Habesch, No. 21.—Heugl. Orn. N. O. Afr. No. 91.

A wing obtained near Antalo was given to me by Lieut. St. John.

Besides these *Caprimulgi* a bright rufous species was seen two or three times on the Anseba in thick wood, but no specimen was shot. This may have been *C. isabellinus*, Temm.

SUB-ORDER *PASSERES.*

FAMILY LANIADÆ.

81. Lanius fallax, Finsch.

Finsch, Trans. Zool. Soc.

This race is distinguished by Dr. Finsch from *L. lahtora*, Sykes, on account of its *greyish breast* and abdomen. The younger birds are dull earthy grey above, the adults pure cinereous as in *L. lahtora*, and Dr. Finsch informs me that he had only seen the former. Lord Walden, who has kindly examined my specimens, and compared them with his fine series of *L. lahtora*, tells me that the only difference he can discover is that in the *fallax* race the secondaries are white-tipped and have the basal half of the inner web white, as in *L. excubitor;* whilst in *L. lahtora* of India, the whole inner web of the secondaries is white. Further examination of specimens from intermediate localities will be necessary.

Lanius fallax was abundant on the shores of Annesley Bay in January and February. It is evidently migratory there, for it had disappeared in May. I again obtained specimens near Massowa in August.

82. L. humeralis, Stanley.

Stanley, in Salt's Voyage, App. p. li.
L. fiscus, Cabanis, Mus. Hein. i. p. 74.
Abyssinian Shrike, Latham, Gen. Hist. Birds, ii. p. 33.
Laniarius collaris, Rüpp. Syst. Uebers. No. 230.—Ferr. et Gal. No. 52.

Iris dark brown, pupil large.

Very common throughout the highlands, and seen as low down as the Anseba valley, where, however, it is rare. It is a true Shrike in all its habits, and has none of the skulking, hiding manner of the bush Shrikes. Rüppell was certainly in error in calling it *Laniarius*. It is usually seen sitting on the tops of bushes, and then pouncing down upon insects.

It breeds in the rainy season. I shot a female containing a completely developed egg on July 18th. The egg was of a bluish green colour.

The most conspicuous distinction between this race and the Cape *L. collaris*, L., is that the Abyssinian bird has the breast pure white, whilst in the southern form it is greyish. Cabanis also states that the northern form has narrower tail feathers, and the dimensions are rather smaller. I give those of a pair collected by myself:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill from front. in.
Male, Senafé	3·7	4·6	0·95	0·58
Female, Adigrat . . .	3·7	4·85	0·98	0·56

I am somewhat surprised that all previous writers should have overlooked Lord Stanley's description of this bird. His measurements of the bill are not quite accurate, but otherwise the description is excellent. I was for some time puzzled by one character mentioned by him, the presence of a chestnut spot on the sides above the thighs; but I find it in one of the specimens before me, a female. In order to detect it, it is necessary in general to turn up the long uropygial feathers. In a male specimen I cannot detect it, so it is certainly not constant, and may be sexual. It is noticed by Cabanis as occurring also in *L. collaris.*

83. **L. isabellinus,** Hemp. and Ehr.

Hemp. and Ehr., Symb. Phys., Aves.—Walden, Ibis, 1867, p. 224, pl. v. f. 1.

Common on the coast in December, January, and February. I shot it also near Massowa in August. In June and July I did not observe it, and think it had migrated. The only specimen of a male in fully adult plumage agrees very well with the figure and description in the "Ibis." A female has the head much less rufous, only the trace of a white band on the primaries, and the under parts pale brownish, with a pinkish tinge. A young bird wants both the band on the quills and the black eye-streak, and has crescentic marks on the breast as in *L. cristatus*, &c. The tail also is dusky. In all there is a sub-obsolete banding of the rectrices. Dimensions :—

	Wing. in.	Tail. in.	Tarsus. in.	Bill from front. in.
Male	3·7	3·55	0·9	·52
Female	3·8	3·75	1·0	·53

84. L. collurio, L.

Enneoctonus collurio, Rüpp. Syst. Uebers. No. 211.

Not common. The only specimen I obtained was shot on the coast in August.

85. L. rufus, Brisson.

Pl. enl. 9, f. 2.—Rüpp. Syst. Uebers. No. 317.

Only seen on the highlands, where it is rare.

86. L. nubicus, Licht.

Lichtenstein, Verz. d. Doubl. p. 47.—Hemp. and Ehr., Symb. Phys.
L. personatus, Temm. Pl. Col. 25, f. 2.—Rüpp. Syst. Uebers. No. 218.

Seen occasionally about Komayli in January and February, and in the lower Lebka valley in August. It appeared to leave the tropical region in the intermediate period, and I did not meet with it in the highlands.

87. Laniarius æthiopicus (Gm.).

Merle noir et blanc d'Abyssinie, Buff. Hist. Nat. des Ois. t. iii. p. 406 (1775 edit.).—Ibid. tome iv. p. 123 (1777).
Turdus æthiopicus, Gm. Syst. Nat. i. part ii. p. 824.—Latham, Ind. Orn. i. p. 357.—Shaw, Gen. Zool. vol. x. p. 237.
Lanius ferrugineus, var. Stanley ; Salt's Journey, App. p. 51.
L. æthiopicus, Vieill. Tab. Enc. et Meth. Ois. p. 731, part.—Rüpp. Neu. Wirb. p. 32.
Telophorus æthiopicus, Rüpp. Syst. Uebers. p. 50, t. xxiii.—Guérin, Rev. Zool. 1843, p. 161.—Ferr. et Gal. Voy. en Abyss. iii. 195.—Atlas, pl. 4.

Iris reddish brown, bill black, legs bluish grey.

A lively active bird, and less skulking in its habits than most bush Shrikes. The male has a most melodious flute-like whistle, rarely single, generally of three or four notes, which must be familiar to every Abyssinian traveller: the answer of the female is a hoarse note, something like that of the common Shrike. Besides this, the bird has another call, like 'tŭk-tŭk-tŭk-tatatatŭk' quickly uttered.

In January and February these Shrikes abounded, generally in families of four or five, in the pass leading to Senafé between 3,000 and 6,000 feet. None were ever seen around Zulla. In May they were common at a much greater elevation, even at 8,000 and 9,000 feet near Senafé, where none were met with three months before. They were occasionally seen in Samhar around Ailat, &c. in July, and they abounded in the Anseba valley. They thus appear to have a considerable range in altitude, being, however, most common at all periods of the year in the subtropical regions. They feed, like other bush Shrikes, on various small insects picked off the leaves and stems.

In July, near Kelamet in the Lebka valley, I saw two couples of these birds together, engaged in a most extraordinary dance-like motion. They were sitting on small branches, moving their bodies up and down, as if courtesying to each other, the males meantime constantly repeating their flute-like notes, to which the females answered. This extraordinary proceeding continued for a long time.

I give the synonymy of this bird at some length, because the species is generally incorrectly attributed to Vieillot or Latham, instead of to Gmelin. A drawing of the bird was brought from Abyssinia by Bruce, and on this drawing Buffon founded his "Merle noir et blanc d'Abyssinie," on the description of which both Gmelin's *Turdus æthiopicus* and Vieillot's *Lanius æthiopicus* were founded.

There can be no doubt also, I think, that this is the *Lanius ferrugineus*, var. of Stanley.

88. L. gambensis (Licht).

Lanius gambensis, Licht. Verz. d. Doubl. p. 48.
? *L. cubla*, Stanley, Salt's Journey, App. p. li.
Dryoscopus cubla, Rüpp. Syst. Uebers. No. 226.

Iris pale reddish orange (burnt sienna), bill and legs bluish grey.

Only seen on the Anseba. A bird of very shy retired habits, much more so than the last species. I did not hear its voice. Dimensions of a pair :—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
Male	3·6	3·1	0·95	0·7
Female	3·4	3·05	0·9	0·7

The male has the top and sides of the head and neck black, with greenish reflections, tail also black. In the female these parts are dusky brown. The underparts are purer white in the male.

89. L. cruentus (H. and Ehr.).

Lanius cruentus, Hemp. and Ehr., Symb. Phys., Aves, t. iii.
Lanius cruentatus, Rüpp. Neu. Wirb. p. 31.
Laniarius cruentus, Rüpp. Syst. Uebers. No. 227.

Iris pearl grey, bill dusky, legs greenish horny.

The male has the throat and centre of breast pure rose-coloured; in the female the upper part of the breast and sides of the throat are black, as excellently shown in Hemprich and Ehrenberg's figure, but they reverse the sexes in the description. This bird has very similar habits to the next species, but is perhaps more easily seen, as it inhabits thinner bushes. It was not rare around Annesley Bay, and was occasionally seen in Samhar and Hahab, up to an elevation of about 3,000 feet, never, however, above the range of tropical flora and fauna. In December and January, small families were met with, hopping along the ground, and flying one after the other from bush to bush like *Crateropi* or *Malacocerci*; in May and June, all met with were in pairs. Measurements:—

	Wing. in.	Tail. in.	Tarsus. in.
Male	3·75	4·8	1·3
Female	3·65	4·4	1·3

90. L. erythropterus (Shaw).

Lanius erythropterus, Shaw's Gen. Zool. Aves, vol. vii. p. 301.
Laniarius erythropterus, Rüpp. Syst. Uebers. No. 229.

Iris peculiar, brown with seven white specks in a circle surrounding the pupil.

A skulking bush-haunting bird and quite intermediate in form between the true Shrikes and the *Crateropidæ*. It has the flight, and to a great extent the habits, of the latter.

In January and February I found the Red-winged Bush Shrike in small families; later in the year they were in pairs. I shot a young bird only just able to fly, near the end of July. I never saw any below about 4,000 feet, and they are common on the highlands.

91. **Nilaus brubru** (Lath.).

Lanius brubru, Lath. Ind. Ornith. Supp. p. xx.
Nilaus brubru, Rüpp. Syst. Uebers. No. 223.

Iris brown, legs bluish grey, rather dark, bill dusky above, paler and greyish beneath.

Usually seen in trees. It was not very common. One specimen was shot at Ailat in Samhar, and two or three others on the Anseba. The feet are very weak for those of a Shrike.

92. **Dicrurus divaricatus** (Licht.).

Musicapa divaricata, Licht. Verz. d. Doubl. p. 52.
Edolius lugubris, Hemp. and Ehr., Symb. Phys., t. viii. 3.
Dicrurus canipennis, Swains. B. West. Afr. i. p. 254.
D. lugubris, Rüpp. Syst. Uebers. No. 216.

Iris red.

Chiefly found in the lower part of the subtropical zone, but occurs also in the coast plain. It is a quicker bird than the well-known "King Crow" of India, but has a somewhat similar call, heard only in the summer.

Dr. Finsch considers the Abyssinian species identical with Lichtenstein's bird from Senegambia. I unfortunately omitted to compare them when in Berlin.

93. **Tchitrea melanogastra** (Swains.).

Musicapa paradisi, and *M. mutata*, var. Salt, Nos. 34 and 35, App. p. xlvii.
Muscipeta melanogastra, Swains. B. of W. Afr. ii. p. 55.—Rüpp. Neu. Wirb. p. 108; Syst. Uebers. No. 211.
M. Ferreti, Guér. Rev. Zool. 1843, p. 162.
Tchitrea Ferreti, Ferr. et Gal. Voy. en Abyss. iii. p. 212; Atlas, pl. 8.—Antinori, Cat. Ucc. p. 46.—Journ. f. Orn. 1867, p. 96.

The variations in this bird's plumage are described by

Antinori (*loc. cit.*). It is by no means clear, however, that they are due to age alone. I have seen specimens in all stages, precisely as with the Indian species, but pure white and black birds are very rare. I never saw but one in Abyssinia, and that I was unable to secure.

The Abyssinian Paradise Flycatcher is most common in the subtropical region, but is also found in warm valleys on the highlands, up to about 7,000 feet, and it is occasionally seen almost at the sea-level.

I find that Dr. Finsch has united the Abyssinian species to that described by Swainson from Senegal. I had previously suspected that the two were identical, the only difference I could detect being the darker or paler colour of the abdomen, which, probably like the various distribution of the chestnut, black, and white colours, and especially the replacement of chestnut by white in the long tail feathers insisted on by Guérin-Meneville, is a distinction due to age.

94. **Platysteira pririt** (Vieill.).

Muscicapa pririt, Vieill. Nouv. Dict. d'Hist. Nat. xxi. p. 486.

Iris golden yellow.

The male has a black breast, female chestnut; they were constantly seen and shot in pairs. Dr. Finsch considers that there are two distinct species, *P. senegalensis* and *P. pririt*, Vieill. in Mr. Jesse's collection. In this case I probably have them also, but not in England. I found this Flycatcher from just above the level of the coast plains to the highland. It was most common about Mayen, in the Senafé pass, and in the Anseba valley, at elevations of from 3,000 to 5,000 feet.

95. **Bradyornis chocolatina,** Rüpp.

Muscicapa chocolatina, Rüpp. Neu. Wirb. p. 107, et Syst. Uebers. p. 49, t. 20.—Ferr. et Gal. Voy. en Abyss. iii. p. 211.
M. fumigata, Guér. Rev. Zool. 1843, p. 161.
Curruca chocolatina, Rüpp. Syst. Uebers. p. 37, t. xiv.

Iris a peculiar greyish yellow, bill bluish grey.

Not very rare on the highlands, generally seen on trees. I am informed by Dr. Finsch that he has examined the original specimen of *Curruca chocolatina,* and that it also belongs to this species.

FAMILY HIRUNDINIDÆ.

96. **Hirundo melanocrissus,** Rüpp.

Rüpp. Syst. Uebers. p. 17, t. v.—Heugl. Orn. N. O. Afr. No. 118.

Only seen by me at low or moderate elevations, but found at greater heights by Rüppell and Heuglin. I do not recollect ever seeing this bird on the tableland.

97. **H. alpestris,** Pall.

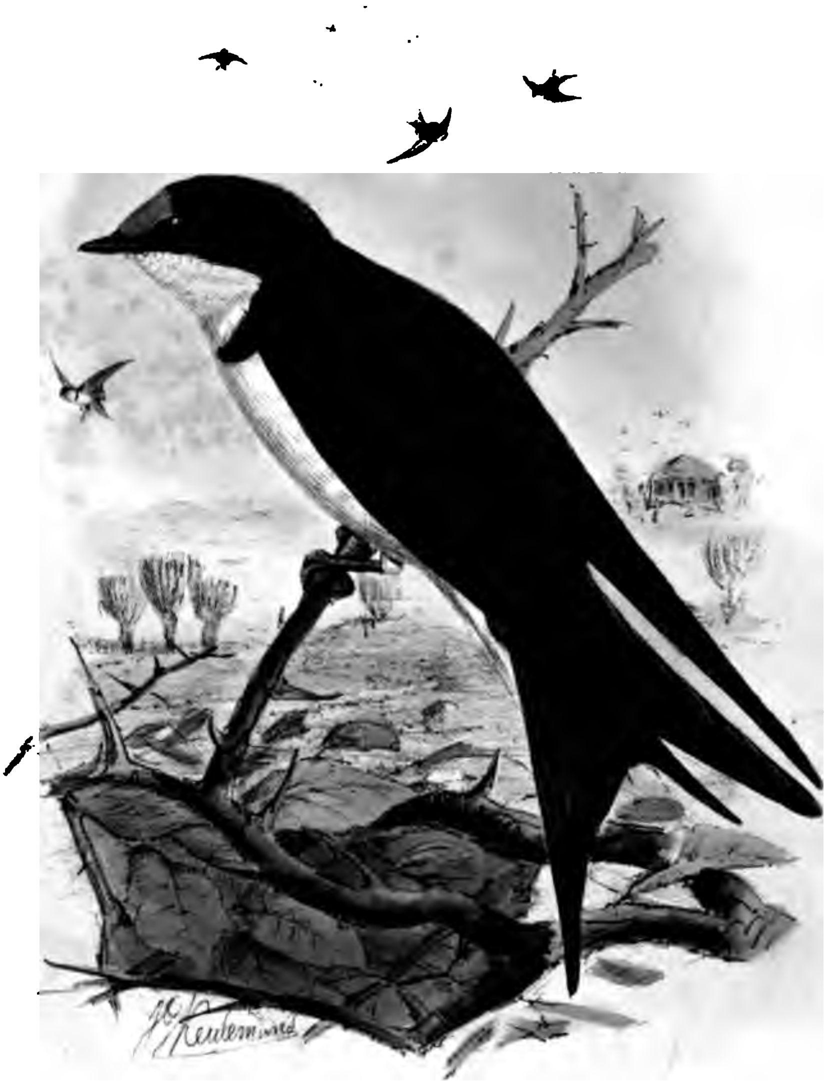
Pallas Zoog. Ros. As. i. p. 534.—Heugl. Orn. N. O. Afr. No. 117.
H. rufula, Temm. Man. d' Orn. iii. p. 298.

I shot two specimens of this bird at Komayli, in February.

98. **H. puella,** Temm.

Fauna Japonica, p. 33.—Heugl. Orn. N. O. Afr. No. 120.
H. abyssinica, Guér. Rev. Zool. 1843, p. 322.—Ferr. et Gal. iii. p. 240, No. 154; Atlas, pl. x.—Lefebvre, p. 77.—Brehm, Habesch, No. 25.
Cecropis striolata, Rüpp. Syst. Uebers. p. 18, t. 6.

This bird appeared to me to replace *H. melanocrissus* in the temperate region. I have, however, very few notes on the Swallows, as I had not many opportunities of shooting specimens.



HIRUNDO ÆTHIOPICA. W Blanf

99. H. rustica, L.

Rüpp. Syst. Uebers. No. 70.—Heugl. Orn. N. O. Afr. No. 111.

Common everywhere. This bird abounded on the shores of Annesley Bay in the middle of June.

100. H. æthiopica, W. Blanf. (Pl. II.).

Ann. and Mag. Nat. Hist., Nov. 1869.

Cecropis rufifrons, Lefebvre, p. 78.—Heugl. Syst. Uebers. No. 113.—Brehm, Habesch, No. 26.

H. albigularis, Strickland apud Heugl. Orn. N. O. Afr. No. 153, p. 113 (nec Strickland, Cont. to Orn. 1849, pl. 17).

H. similis H. albigulari, *Strickl. sed conspicu minor et torque pectorali interrupta, gutture pectoreque rufescenti-lavatis.*

Fem. *Long. tota* 5·25 *in., alæ* 4·3, *rect. med.* 1·5, *ext.* 2·3, *tarsi* 0·45, *rostr. a fr.* 0·3, *a rictu* 0·5, *poll. et dec. Angl.*

This species is very similar in coloration to the South African *H. albigularis*, Strickland (Jard. "*Contrib. to Ornith.*," 1849, p. 17—4 *with plate*), but conspicuously smaller, Strickland's dimensions being—whole length 7 in., wing 5 in. 2 lines, median rectrices 2 in., outer ditto 3 in. 4 lines, so that the closed wing in the Abyssinian bird is nearly an inch shorter. The pectoral band also is imperfect in all the specimens I have been able to examine. That the northern and southern species are distinguishable is certain, and they are correctly separated by Von Heuglin in his new work, but it is equally clear that it is a mistake to apply Strickland's name to the north-eastern race, since Strickland's measurements and description are unquestionably those of the southern form, and he particularly mentions that one of the two specimens in his possession came from South Africa. He discriminates the species from *H. rufifrons* of Vieillot founded on Le Vaillant's figure of the *Hirondelle* *à front roux* ("Ois. d'Afr." pl. 245, f. 2), with the whole throat and upper breast black, and adds that it is the *H. rufifrons* of Shaw. The synonymy is :—

1. *H. rufifrons*, Vieill. Nouv. Dict. d'Hist. Nat. xiv. p. 521.—Enc. Meth. p. 524.—*Hirondelle à front roux*, Le Vaillant Ois. d'Afr. pl. 245, fig. 2.—Stephens, Shaw's Zoology, Aves, x. p. 91.—Bp. Consp. p. 318. Sundevall om Le Vaill. Ois. d'Afr. p. 51.
   (I cannot help suspecting that Le Vaillant's plate is founded on a bad specimen of *H. rustica* from Senegal, perhaps restored or manufactured.)
2. *H. albigularis*, Strickland (*loc. cit.*),—*H. rufifrons*, Vieill. apud Lesson, Traité d'Ornith. p. 268, nec Vieill.—*H. albigula*, Bonp. Consp. p. 338.
3. *H. æthiopica*, sp. nov. ut supra.
   (If, as appears highly probable, Vieillot's name must be given up as being applicable to a manufactured or imaginary bird, No. 2 will stand as *H. rufifrons*, Less. Strickland's name is to be preferred, to avoid ambiguity.)

101. **H. ruficeps**, Licht.

Verz. d. Doubl. des Zool. Mus. Berl. p. 58.—Ferr. et Gal. iii. No. 225.
Cecropis filicaudata, Rüpp. Syst. Uebers. No. 75.
Ubromitus filifera, Brehm, Habesch, No. 28.
H. filifera, Heugl. Orn. N. O. Afr. No. 115.

I only saw this Swallow once, when I shot a pair, a male and female, sitting together on a spray overhanging a small stream near Agula, about half-way between Adigrat and Antalo. The outer tail feathers are very much shorter than is usual in Indian specimens, and I am far from convinced that the species are identical. If they be, of course the prior name of *H. filifera*, Stephens, must apply.

In both the specimens shot by me, the chin, throat, and breast are pale buff, with an imperfect dusky pectoral band, much more marked in the female. In the original description by Lichtenstein this is noticed, "fascia pectorali obsolete ferruginea." In the male the head is bright chestnut above; in the female, doubtless a young bird, dark brown. Measurements :—

	Wing. in.	Middle tail feathers. in.	Outer tail feathers. in.
Male	4·6	1·3	4·6
Female	4·3	1·35	1·8

102. Psalidoprocne pristoptera (Rüpp.).

Hirundo pristoptera, Rüpp. Neu. Wirb. p. 105, t. xxxix. f. 2.
Chelidon pristoptera, Rüpp. Syst. Uebers. No. 81.
Atticora pristoptera, Brehm, Habesch, No. 23.
Psalidoprocne pristoptera, Sclater, P. Z. S. 1864, p. 109.—Heugl. Orn. N. O. Afr. No. 148.

I shot but a single specimen of this curious little bird. I saw it occasionally both on the highlands and in the Anseba valley. In habits and flight it differs in no important respect from other Swallows, so far as I observed.

103. Chelidon urbica (Linn.).

Rüpp. Syst. Uebers. No. 80.—Heugl. Orn. N. O. Afr. No. 129.

A single specimen obtained at Komayli in February. It was hunting over jungle in company with *Hirundo rustica* and *H. melanocrissus.*

104. Cotyle cincta (Bodd.).

Hirundo cincta, Bodd.—Heugl. Orn. N. O. Afr. No. 125.
H. torquata, Gmelin.—Rüpp. Syst. Uebers. No. 76.

I twice found this Martin abundantly, first on the shores of Lake Ashangi in April, and again about a fortnight later on the banks of a stream near Antalo.

105. C. rupestris (Scopoli).

Heugl. Orn. N. O. Afr. No. 122.

A very common bird in the rocky passes, and found almost from the sea-level to 8,000 feet. A specimen from Senafé differs in no respect from others brought from Southern Europe. Singularly enough, a single specimen obtained by Mr. Jesse appears to belong to a small variety of the southern form *C. fuligula*, Licht. I probably saw both. Heuglin only gives *Cotyle obsoleta*, Cab., a paler form, as common in Abyssinia. If I obtained either of the other species, I have overlooked them.

106. C. minor, Cab.

Cab. Mus. Hein. pt. .i p. 49.—Heugl. Orn. N. O. Afr. No. 166.

But a single specimen was obtained, which agrees well with Cabanis's description, except that the chin and throat are ashy grey instead of yellowish grey. The only difference I can see between the bird brought back by myself and a specimen of *C. palustris* are the smaller size and the rather squarer tail of the former. I am indebted to Mr. R. B. Sharpe for this identification.

This little Bank Martin was seen in countless swarms on Lake Ashangi in April. They kept much in flocks, roosting amongst reeds at night.

Dimensions, wing 3·9 in., tail 1·9, whole length about 4¾ in.

FAMILY NECTARINIDÆ.

107. **Nectarinia habessinica**, Hemp. and Ehr.

Symb. Phys., Aves, Taf. IV.—Rüpp. Syst. Uebers. No. 112. Ferr. et Gal. No. 175 and 176.—Brehm, Habesch, No. 40.—Heugl. Orn. N. O. Afr. p. 229.

Cinnyris gularis, Rüpp. Neu. Wirb. p. 88, t. xxxi. f. 2 (the young bird).—Syst. Uebers. No. 111.

Very common near the coast, and, up to about 4,000 feet above the sea, in the passes leading to the highlands. In January and February many birds were in the plumage described by Rüppell as *N. gularis.* Others, however, were in the full plumage, and it is not quite clear whether the *gularis* plumage is assumed by all males after the breeding season or whether it is only the livery of the first year. I am strongly inclined to the latter opinion. The nest, figured by Ehrenberg, and which I also found, is very similar to that of *Nectarinia asiatica.*

That *N. gularis* is identical with *N. habessinica* cannot, I think, admit of a doubt. I only saw the former in places where the latter also occurred. I shot two or three specimens when trying to obtain females (always more difficult to see and procure than the males), and one specimen which I shot was moulting and in intermediate plumage.

108. **N. affinis**, Rüpp.

Rüpp. Neu. Wirb. p. 87, t. xxxi. f. 1; et Syst. Uebers. No. 110.—Ferr. et Gal. No. 177.—Lefebvre, p. 87.—Brehm, Habesch, No. 41.—Heugl. Orn. N. O. Afr. p. 232.

This replaces *N. habessinica* above 3,500 to 4,000 feet and extends upwards into the temperate region. It breeds about May, and I saw young birds with the parents in July. The extent of blue on the neck appears to vary slightly.

109. **N. Jardinii**, Verreaux.

Hartlaub, Orn. West Afr. No. 133, p. 47.—Heugl. Orn. N. O. Afr. p. 227.

I am indebted for a specimen of this Sun-Bird to Captain Sturt. I did not myself meet with it. The specimen given to me was shot at an elevation of between 5,000 and 6,000 feet below Senafé, as was another obtained by Mr. Jesse.

Dimensions of a male: Wing 2·6 in., tail 1·85, tarsus 0·65, bill from front 0·7, whole length about 4·75 in.

110. **N. cruentata**, Rüpp.

Rüpp. Syst. Uebers. p. 26, t. ix.—Ferr. et Gal. No. 179.—Brehm, Habesch, No. 43.—Heugl. Orn. N. O. Afr. p. 228.

Not a common bird anywhere, and only seen in the upper part of the subtropical and in the temperate region. It was occasionally met with about Senafé and in the upper part of the pass. I again met with it in the Anseba valley, keeping, however, to the hills around, and Mr. Jesse shot two or three specimens. It is an exquisitely coloured bird when in full plumage; more beautiful perhaps than its more gaudily attired allies.

111. **N. tacazze**, Stanley.

Certhia tacazze, Stanley; Salt's Journey, Appendix, p. 58.
Cinnyris tacazze, Rüpp. Neu. Wirb. p. 89, t. xxxi. f. 3.—Ferr. et Gal. No. 177.—Lefebvre, p. 88.
Nectarinia tacazze, Rüpp. Syst. Uebers. No. 108.
Nectarina tacaziena, Heugl. Orn. N. O. Afr. p. 222.

This fine *Nectarinia* ranges to a much higher elevation than the other species. It was common about Senafé and Adigrat, and was still abundant at 10,500 feet on the Wandaj pass. The non-breeding plumage is dull; it is only in the breeding season that the males acquire their rich purple colour.

In May they were apparently breeding about Senafé. It was very difficult to find the females, which were probably occupied in incubation. A collector of mine shot seven or eight males, and on my sending him out again for females he could only obtain one.

112. N. metallica, Licht.

Verz. der Doubl. p. 15.—Rüpp. Atlas, p. 10, t. vii.—Hemp. and Ehr. Symb. Phys. t. i.—Rüpp. Syst. Uebers. No. 109.—Ferr. et Gal. No. 174.—Lefebvre, p. 89.—Brehm, Habesch, No. 39.—Heugl. Orn. N. O. Afr. p. 222.

In December, January, and February, *N. habessinica* was the only Sun-Bird seen near the coast. The present species first appeared in March. It was only met with in the tropical region, but about Komayli it was common in pairs in June, and apparently commencing to breed. I saw one nest of cocoons, tree-cotton, and fine grass. It was suspended from an acacia, and had the usual form, with an entrance from the side; there were no eggs in it in the commencement of June. After the breeding season this bird probably loses its long tail-feathers, as they were wanting in a specimen I shot in the beginning of August. I also met with *N. metallica* in Samhar, the Lebka valley, and very rarely on the Anseba.

113. N. pulchella, Vieill.

Rüpp. Syst. Uebers. No. 107.—Ferr. et Gal. No. 173.—Heugl. Orn. N. O. Afr. p. 223.

Common on the Anseba, especially in the thickets near the river, usually upon high acacia trees, but not seen anywhere else. Females were very rarely noticed. This bird has a fine song.

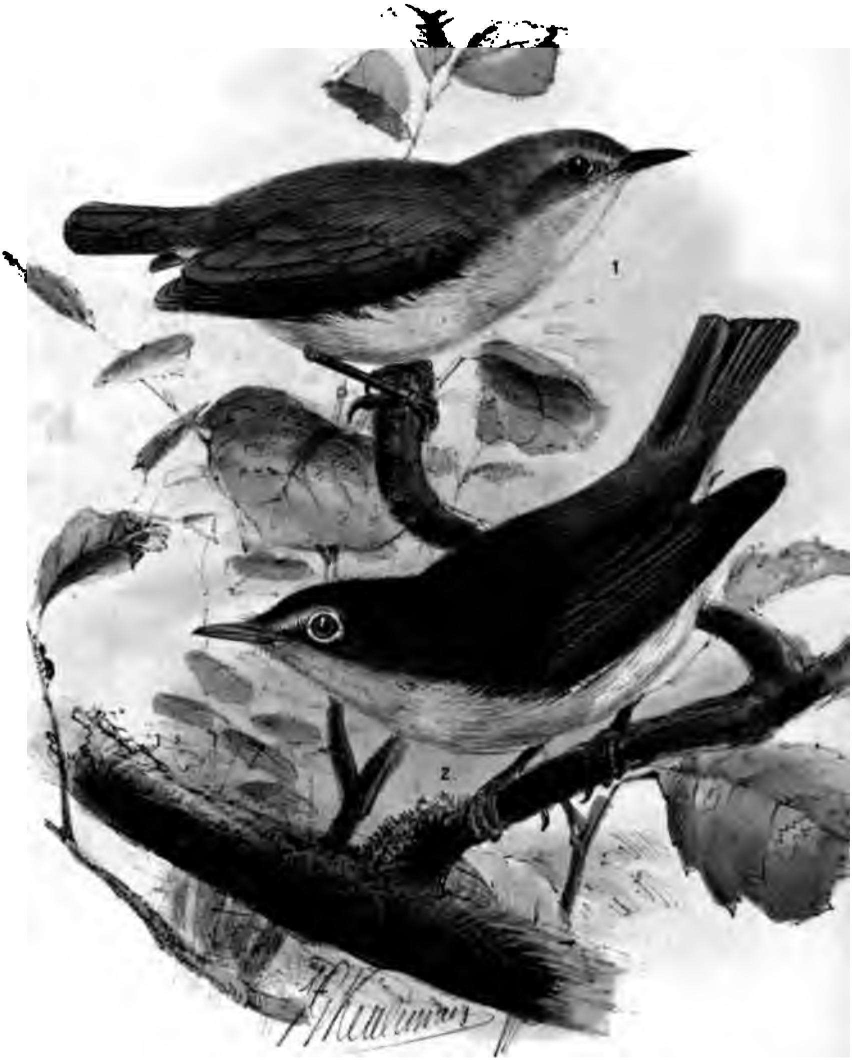
Specimens of *N. pulchella* without the elongated tail-feathers are often mistaken for *N. habessinica.* They may be distinguished by being bronzed green and not purple on the crown of the head, and by the shorter bill.

FAMILY MELIPHAGIDÆ.

114. Zosterops poliogastra, Heugl.

Von Heuglin, Ibis, 1861, p. 357, pl. xiii.; et Orn. N. O. Afr. p. 412. Hartlaub, Journ. of Ornith. 1865, p. 9.

I obtained a solitary female specimen of a *Zosterops* at Dongolo, which I can only refer to this species. It appears to differ in having the forehead bright yellow; in the black of the lores extending slightly under the eye; the yellow supercilium, which in the figure in the "Ibis" is represented as much produced behind, scarcely distinguishable beyond the middle of the eye; the upper tail coverts are not yellow but green, the same colour as the back; and the general colouring cannot be correctly termed "*virescenti-flava.*" It is green with an olivaceous tinge. The dimensions too are identical. Length 5 in., bill from front 0·4, wing 2·5, tail 1·8, tarsus 0·7. If new, this may be called *Z. flavigula.*



1 EREMOMELA GRISEO-FLAVA, Heugl.
2. PHYLLOSCOPUS ABYSSINICUS, W. Blanf.

115. Z. abyssinica, Guér.

Guérin, Rev. Zool. 1843, p. 162.—Ferr. et Gal. Voy. en Abyss. part iii. p. 209; Atlas, pl. ix. f. 2.
?*Z. madagascariensis*, Rüpp. Syst. Uebers. No. 150.

I shot two specimens of this bird in the Komayli pass at Mayen, 3,500 feet above the sea. Dimensions of a female:—Wing 2·25 in., tail 1·7, tarsus 0·6, bill at front 0·4 in.

116. Eremomela griseoflava, Heugl. (Pl. III. fig. 1.)

Von Heuglin, Journ. f. Orn. 1862, x. p. 40, et Orn. N. O. Afr. p. 284.

I only met with this lively and active little bird in the Anseba valley and its neighbourhood, where it was first found by Von Heuglin. It has much the same habits as *Zosterops.* It appeared to be in parties of three or four constantly moving amongst the bushes. I preserved a pair, of which the following are the dimensions:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill from front. in.
Male	2·0	1·1	0·7	0·36
Female	2·0	1·05	0·68	0·36

In coloration this bird scarcely differs from *E. flaviventris*, Sund. It is, however, smaller in all its measurements. The position of *Eremomela* in the series is somewhat dubious. I cannot see that it has any affinity with *Drymœca*, but it certainly approaches *Phylloscopus* and *Oligura.* It appears to me, however, to be most closely allied to *Zosterops*, especially to the grey-coloured form, *Malacirops* of Bonaparte.

FAMILY PARIDÆ.

117. Parus leucopterus, Swains.

Birds of W. Afr. ii. p. 42.
Parus leucomelas, Rüpp. Neu. Wirb. p. 100, t. xxxvii. f. 2; et Syst. Uebers. No. 170.—Heugl. Orn. N. O. Afr. p. 407.

This species I only saw in the Anseba valley, but Captain Sturt gave me a specimen shot near Senafé. Measurements:—Wing 3·2 to 3·25 in., tail 2·5 to 2·6, tarsus 0·8, beak 0·5.

Rüppell in his description ("Neu. Wirb." p. 100, note) referred to Swainson's prior description of this species, but proposed a new name, because Swainson had confounded the Cape species, *P. niger*, with it. There can be no question that both Swainson and Rüppell described and figured the same species, for which Swainson's name is thus proved by Rüppell's own remark to be the oldest. Swainson's title-page is undated (the date was 1837), and Rüppell's "Neue Wirbelthiere" was published at intervals between 1835 and 1840.

118. P. leuconotus, Guér.

Guér. Rev. Zool. 1843, p. 162.—Ferr. et Gal. Voyage en Abyss. iii. p. 222; Atlas, pl. ix. f. 1.—Heugl. Orn. N. O. Afr. p. 408.
P. dorsatus, Rüpp. Syst. Uebers. No. 253, p. 42, t. xviii.

Occasionally seen about Senafé and Adigrat, but not very common.

Measurements of four specimens:—Wing 3·1 to 3·2 in., tail 2·55 in.

FAMILY TURDIDÆ.

119. Turdus simensis, Rüpp.

T. musicus, high-coloured variety, Salt, No. 40, App. p. 58.
T. simensis, Rüpp. Neu. Wirb. p. 81, t. xxix. f. 1.—Syst. Uebers. No. 190.
T. semiensis, Heugl. Orn. N. O. Afr. p. 380.

Common throughout the highlands, but not observed below 5,000 or 6,000 feet elevation. I did not meet with this Thrush in the Anseba valley. In the stomach of specimens killed in February, I found various insects, including ants. All the specimens collected are much less rufous beneath than in Rüppell's figure.

In a male the wing measured 5·2 in., tail 2·9, tarsus 1·4; in a female, wing 4·3 in., tail 2·7, tarsus 1·3 in.

120. T. olivacinus, Bp.

Bonaparte, Consp. Gen. Av. p. 273.—Heugl. Orn. N. O. Afr. p. 382.
? *T. abyssinicus*, Gm. Syst. Nat. i. part 2, p. 824.
Merula olivacea, Rüpp. Syst. Uebers. No. 194.
Turdus olivaceus, Ferr. et Gal. No. 54.—Lefebvre, p. 168.

I obtained specimens of this Thrush at Senafé, Adigrat, and Lake Ashangi. At the latter locality it was not rare. It was not seen away from the highlands, and in the Anseba valley appeared to be replaced by *T. pelios*, Bp., of which Mr. Jesse obtained specimens. A male measures :—Wing 4·7 in., tail 4·1, tarsus 1·3; a female, wing 4·4 in., tail, 3·75, tarsus 1·3 in.

121. Petrocincla cyanea, L.

Rüpp. Syst. Uebers. No. 187.—Heugl. Journ. f. Ornith. 1869, p. 145.
Monticola cyana, Heugl. Orn. N. O. Afr. p. 371.

Occasionally met with on the highlands.

122. P. saxatilis, L.

Rüpp. Syst. Uebers. No. 188.—Heugl. Journ. f. Orn. p. 146.
Monticola saxatilis, Heugl. Orn. N. O. Afr. p. 370.

Rare on the highlands. I am indebted to Captain Newport for a specimen shot at Adigrat. I did not myself kill any.

123. P. rufocinerea, Rüpp.

Saxicola rufocinerea, Rüpp. Neu. Wirb. p. 76, t. xxvii. f. 1 and 2. —Syst. Uebers. No. 166.
Thamnolæa rufocinerea, Heugl. Journ. f. Orn. 1869, p. 151; et Orn. N. O. Afr. p. 369.

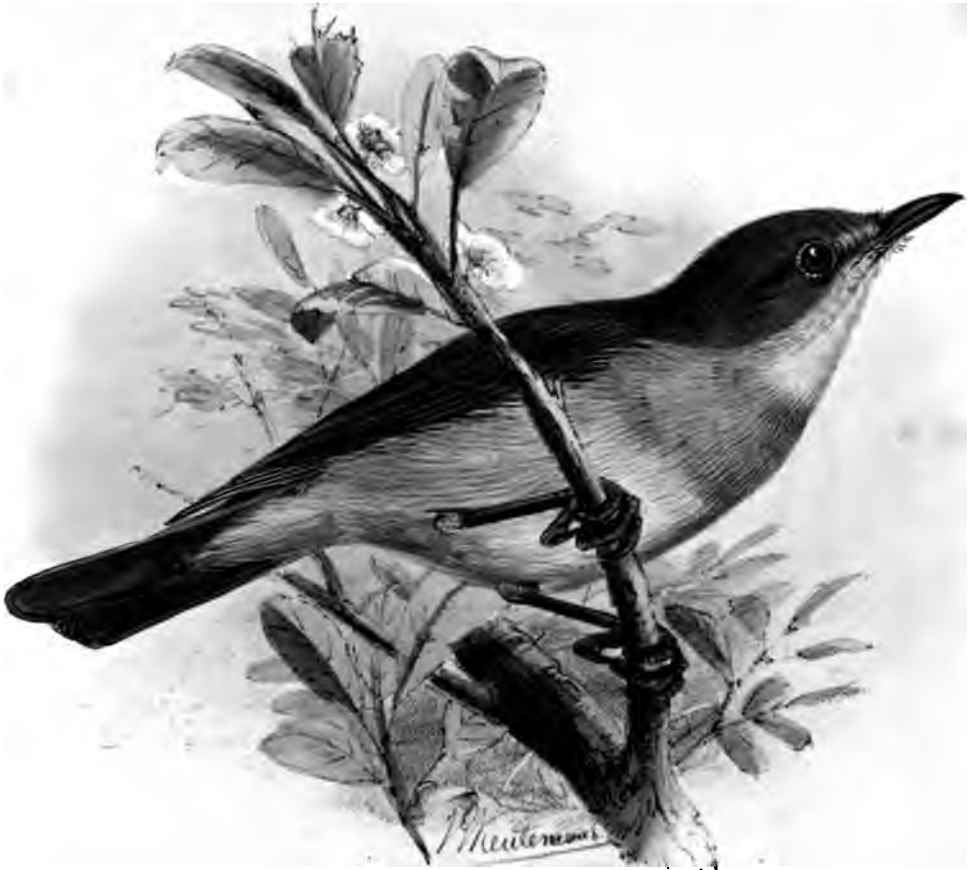
By no means rare on the highlands, and found as low as about 4,500 feet. It appears to be a permanent resident, as I saw it on the hills close to the Anseba valley in pairs, in July. The female is much greyer than the male. It has very much the habits of a Redstart, and is, in coloration also, a connecting link between the *Ruticillinæ* and the true Thrushes. It is in no way a *Saxicola*, nor, I think, a *Thamnolæa* either. In the stomach were small insects. Measurements:—

	Wing. in.	Tail. in.	Tarsus. in.
Male	3·4	2·5	1
Female	3·25	2·4	1

124. Ruticilla phænicura, L.

Rüpp. Syst. Uebers. No. 142.
Turdus phœnicurus, Salt, No. 39, App. p. xlvii.

Not very common about Senafé in February and March.



Keulemans lith.

RUTICILLA? FUSCICAUDATA, W. Blanf.

Printed and Coloured by
P. W. M. Trap, Leiden.

125. Ruticilla (?) fuscicaudata, W. Blanford (Plate IV.).

Ann. and Mag. Nat. Hist. Nov. 1869.

R. supra brunnescenti-fusca, uropygio magis rufescenti, remigibus rectribusque fuscis, vix pallidiori-marginatis, macula preoculari nigrescenti, albido-circumdata, mento, gula, abdomineque medio sordide albis, pectore et hypochondriis cinerascentibus. Rostro pedibusque fuscis.

Long. alæ 2·95 *in., caudæ* 2·2, *tarsi* 9·9, *rostri a fronte* 0·45, *a rictu* 0·7, *tota circa* 5·5, *poll. et dec. Angl.*

Hab. in Abyssiniâ septentrionali.

This is a somewhat anomalous bird. In the general form, the bill, and non-scutellated tarsi it agrees with *Ruticilla*, but the sombre plumage rather resembles that of a *Sylvia*. The tail also is more rounded. It approaches nearest to *R.* (*Saxicola*) *familiaris*, Stephens, and *R.* (*Erythacus*) *sinuata*, Schlegel. None of the three are typical *Ruticillæ*. But for the non-scutellated tarsi I should have placed the present form in *Sylvia*. It may be allied to *Cuphopterus*.

I obtained a single specimen only on the hills between the Anseba and Lebka valleys, at an elevation of about 4,000 feet, in bushes.

I see that, in his new work, Von Heuglin identifies my new species with his *Saxicola scotocerca*. I believe my name, published on the 1st of November, has priority over Dr. Von Heuglin's, first "published" in the 9th—11th *livraison* of his "Ornithologie Nord-Ost Afrikas," which did not reach England till the middle of December, though it may have been issued in Germany a week or two sooner.

126. Cossypha semirufa (Rüpp.).

Petrocincla semirufa, Rüpp. Neu. Wirb. p. 81.
Bessonornis semirufa, Rüpp. Syst. Uebers. p. 44, t. 21.—Lefebvre, p. 96.
Cossypha rubrocapilla, Guér. Rev. Zool. 1843, p. 162.
C. semirufa, Ferr. et Gal. Voy. en Abyss. iii. p. 202; Atlas, pl. 6.—Heugl. Journ. f. Orn. 1869, p. 147.
Bessornis semirufa, Heugl. Orn. N. O. Afr. p. 376.

Not a common bird, but generally distributed in the temperate region, and met with at nearly 10,000 feet on the Alaji pass. I also saw it on the Anseba.

A specimen from Guna Guna measures, wing 3·3 in., tail 3·3 in.

127. Cercotrichas erythropterus (Gm.).

Turdus erythropterus, Gm. Syst. Nat. i. p. 835.
Cercotrichas erythropterus, Rüpp. Syst. Uebers. No. 195.—Heugl. Orn. N. O. Afr. p. 280.

Common amongst bushes, especially along the banks of stream beds in Samhar and the country around Annesley Bay. Its habits are precisely those of the Indian *Thamnobiæ*; it keeps much to the ground, and has a habit of jerking its tail completely over its back, especially when stopping after running or on settling from flight. It appeared to me to be more of a ground bird than the Indian Shama, *Copsychus macrourus*.

128. Thamnolæa albiscapulata, Rüpp.

Saxicola albiscapulata, Rüpp. Neu. Wirb. p. 74, t. 26, f. 1.
Thamnobia albiscapulata, Rüpp. Syst. Uebers. No. 168.
Thamnolæa albiscapulata, Heugl. Journ. f. Ornith. 1869, p. 149; et Orn. N. O. Afr. p. 367.

Usually found near water, especially about the rocky banks of streams. It was seen from the sea-level to the highlands, and was common in the pass wherever water was to be found, as in the Sooroo defile. It feeds on insects: on one occasion I found ants in the stomach.

Measurements :—

	Wing. in.	Tail. in.	Tarsus. in.
Male	4·65	3·65	1·2
Female	4·4	3·5	1·1

129. Thamnobia melæna (Rüpp.).

Saxicola melæna, Rüpp. Neu. Wirb. p. 77, t. 21, f. 2; Syst. Uebers. No. 154.—Heugl. Journ. f. Orn. 1869, p. 153.
Pentholæa melæna, Heugl. Orn. N. O. Afr. p. 364.

Pretty common on the highlands, keeping much to rocky places amongst bushes. It has much the habits of the Indian *Thamnobiæ*, and jerks its tail like them. In the stomach I found only insects, principally small *Coleoptera*.

130. Saxicola œnanthe, L.

Rüpp. Syst. Uebers. No. 161.—Heugl. Journ. f. Orn. 1869, p. 158; et Orn. N. O. Afr. p. 347.

Only seen about Senafé and Adigrat on the highlands in March. It was not noticed earlier, and appeared to be migrating northwards.

131. S. isabellina, Rüpp.

Rüpp. Atlas, p. 52, t. 34, f. 2; Syst. Uebers. No. 159.—Heugl. Journ. f. Orn. 1869, p. 157; et Orn. N. O. Afr. p. 344.

Equally common on the highlands and in the plains on the coast until the middle of March. All other species appeared restricted to one region or the other.

There appears to have been much confusion about this species, and I have seen specimens of *S. frenata* which were distributed by Rüppell himself for it.

132. S. frenata, Heugl.

Journ. f. Orn. 1869, p. 158; et Orn. N. O. Afr. p. 345.

It is extraordinary that this bird should have remained until so recently unnamed. Specimens of it are to be found in many museums, and both in London at the British Museum and at Calcutta there are examples received from Dr. Rüppell as *S. isabellina.* Indeed I think Dr. Rüppell must have considered this bird as the summer plumage of that species. Mr. Tristram, however, informs me that he has a smaller race labelled *Saxicola sordida* by Dr. Rüppell. The true *S. sordida* is a very different bird.

I only met with *S. frenata* on the very highest portions of the Wadela plateau, near Saintora and Gazoo, at an elevation of 10,500 feet above the sea; there it abounded. Von Heuglin states that he has seen it at a much lower elevation also.

133. S. deserti, Rüpp.

Temm. Pl. Col. 350, f. 2.—Rüpp. Syst. Uebers. No. 153.—Heugl. Journ. f. Orn. p. 161; et Orn. N. O. Afr. p. 352.

Only seen close to the coast. Abundant in December and January about Annesley Bay, but it became scarce and appeared to migrate in February. There were none in May, June, July, or August near Annesley Bay and Massowa. This species can scarcely be a permanent resident on the coast at least, as Von Heuglin appears to think probable.

and therefore belongs probably to this race. The tail is a little shorter, very much more rounded, and the rectrices are of rather different shape, being more pointed. In *P. pastor* the central rectrices are only white at the extreme base, and on the outermost pair nearly 1½ in. at the end is black; whilst in the specimen from Annesley Bay the white on the base of the central rectrices extends nearly to the end of the coverts, and on all the outer rectrices only about ¾ in. at the end is black. The junction of black and white is zigzagged, the black running to a point up the quill and the inner margin, the white extending further down on the outer margin and the centre of the inner web. The middle rectrices are 0·2 in. longer than the outer ones. The bill appears to be very slightly more slender. I can see no other differences. The measurements are :—

Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
2·85	1·97	0·9	0·42

140. **P. semitorquata**, Heugl. (Plate V.).

Journ. f. Orn. 1869, p. 166, et Orn. N. O. Afr. p. 341.

I had named and described this bird at a meeting of the Zoological Society of London when Von Heuglin's description appeared in the "Journal für Ornithologie." He is only acquainted with the male; I therefore append a description and figure of both sexes :—

Mas. niger, macula subquadrata collari laterali, fascia alari longitudinali ex remigibus secundariis ultimis cum earum tectricibus compositâ, abdomine toto cum hypochondriis uropygioque albis; rostro pedibusque

thick jungle, nor does it perch on the tops of bushes like the true *Saxicolæ*. *Cercomela melanura* is common at Aden, and apparently throughout the district of the Red Sea.

137. Pratincola rubetra, L.

Rüpp. Syst. Uebers. No. 165.—Heugl. Journ. f. Orn. 1869, p. 167; et Orn. N. O. Afr. p. 338.

I only once met with this species, when I shot a young bird at Rairo in Habab, about the middle of August, at an elevation of 3,000 feet above the sea.

138. P. pastor, Strickland.

Strickland, Ann. Mag. Nat. Hist. 1844, xiii. p. 410.
Saxicola pratincola sybilla, Heugl. Journ. f. Orn. 1869, p. 188; et Orn. N. O. Afr. p. 341.

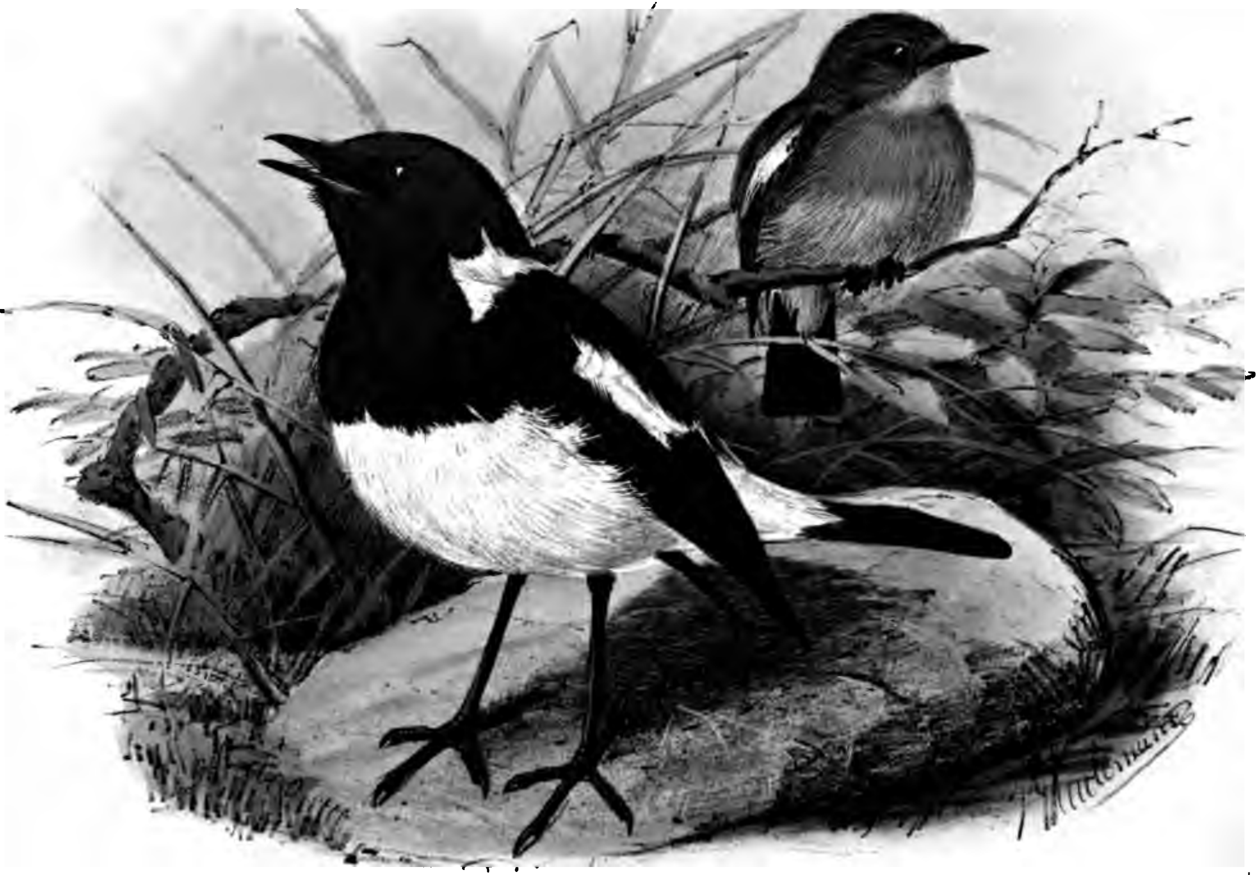
Not rare on the highlands. As mentioned by Von Heuglin, this bird appears to breed in Abyssinia. I shot specimens at Senafé at the end of May. I did not obtain *P. rubicola*. All my specimens have a broad white uropygium, more or less tinged with ferruginous. Dimensions:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.	
Male, Adigrat .	2·9	2·1	0·85	0·45	(bill abnormally long
„ Senafé .	2·95	2·1	0·85	0·37	
Female, Senafé .	2·8	2·03	0·85	0·43	

139. P. Hemprichii, Ehr.

Saxicola Hemprichii, Ehr. Symb. Phys.—Heugl. Journ. f. Ornith. 1869, p. 168.
Pratincola rubicola Hemprichii, Heugl. Orn. N. O. Afr. p. 339.

A single male specimen from the shores of Annesley Bay differs from those from the highlands by having much more of the basal portion of the tail-feathers white.



PRATINCOLA SEMITORQUATA, Heugl.

and therefore belongs probably to this race. The tail is a little shorter, very much more rounded, and the rectrices are of rather different shape, being more pointed. In *P. pastor* the central rectrices are only white at the extreme base, and on the outermost pair nearly 1½ in. at the end is black; whilst in the specimen from Annesley Bay the white on the base of the central rectrices extends nearly to the end of the coverts, and on all the outer rectrices only about ¾ in. at the end is black. The junction of black and white is zigzagged, the black running to a point up the quill and the inner margin, the white extending further down on the outer margin and the centre of the inner web. The middle rectrices are 0·2 in. longer than the outer ones. The bill appears to be very slightly more slender. I can see no other differences. The measurements are :—

Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
2·85	1·97	0·9	0·42

140. **P. semitorquata,** Heugl. (Plate V.).

Journ. f. Orn. 1869, p. 166, et Orn. N. O. Afr. p. 341.

I had named and described this bird at a meeting of the Zoological Society of London when Von Heuglin's description appeared in the "Journal für Ornithologie." He is only acquainted with the male; I therefore append a description and figure of both sexes :—

Mas. niger, macula subquadrata collari laterali, fascia alari longitudinali ex remigibus secundariis ultimis cum earum tectricibus compositâ, abdomine toto cum hypochondriis uropygioque albis; rostro pedibusque *nigris. Long. alæ* 2·65, *caudæ* 1·95, *tarsi* 0·85, *rostr. a fr.* 0·4, *tota circa* 5 *poll. Angl. et dec.*

Fœmina supra brunnea, plumis rufo-marginatis; superciliis, mento, gula superiori abdomeneque isabellinis, hoc pallidiori, fascia alari longitudinali et uropygio albis, pectore ferrugineo, remigibus cum tectricibus alarum fusco-brunneis, vix pallide marginatis, rectricibus nigricantibus; a mari dimensionibus non discrepat.

This bird is very near the Indian *P. caprata*, L. The male is at once distinguished by the white mark at the side of the neck, the female by being much more rufous on the under-parts. It is not a rare bird in Abyssinia, and it is surprising that it has remained so long undescribed. I collected three pairs. I first met with it near Adigrat, where it was far from scarce, and I again met with it on some of the passes south of Antalo, and at Lake Ashangi. It was never noticed below about 8,000 feet of elevation, but at the same time I did not observe it in the higher plateaux, so that it appears to belong to the temperate rather than to the subalpine fauna.

141. **P. sordida** (Rüpp.).

Saxicola sordida, Rüpp. Neu. Wirb. p. 75, t. xxvi. f. 2. et Syst. Uebers. No. 176.—Heugl. Journ. f. Orn. 1869, p. 164; et Orn. N. O. Afr. p. 342.

This Bush Chat belongs to the subalpine fauna, and was never seen below 9,000 feet. Above that height it was common. It kept much to rocky parts of the hills. It is by no means a typical *Pratincola*, the bill being rather larger and the tarsi much longer, but it is much nearer to that genus than to true *Saxicola*. The following are the dimensions of a pair:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill from front. in.
Male	2·55	1·6	0·95	0·5
Female	2·75	1·8	1·1	0·45

142. **Grandala leucogaster** (Gm.).

Turdus leucogaster, Gm. Syst. Nat. vol. i. pt. ii. p. 819.
Lamprotornis leucogaster, Rüpp. Neu. Wirb. p. 24; et Syst. Uebers. No. 245.
Pholidauges leucogaster, Cab. Mus. Hein. i. p. 198.—Brehm, Habesch, No. 85.—Heugl. Journ. f. Orn. 1869, p. 10.

Iris dark grey within, and an outer circle of yellowish grey.

This beautiful bird appears to me fairly congeneric with the Himalayan *Grandala cœlicolor*, Hodgson. Both are of very dubious affinity, but their relationship to the Starlings is at least as questionable as to the *Saxicolinæ*. Their very short legs contrast with both, whilst the form of the wing is quite different from that found amongst the short-legged Bulbuls and Orioles to which the present form might otherwise be assigned The habits are rather Starling-like.

There appears to have been some doubt on the part of previous observers as to whether the plain thrush-like plumage is the livery of the female or only of the young. The latter is stated by Rüppell and Heuglin. The former was the case in all the birds shot by me, and a very large number of pairs seen by me in May consisted of a brilliantly-plumaged male and a dull female. Mr. Jesse and Captain Sturt, who both frequently saw and shot the bird, came to precisely the same conclusion, and it is this difference of plumage in the two sexes and the colouring of the female which tend to unite this bird so closely with *Grandala cœlicolor.*

From December up to the end of February this bird was entirely absent from the passes below Senafé. About the commencement of March flocks began to make their appearance, and the numbers gradually increased. The flocks consisted of males and females. In May, when I returned from the highlands, I found these lovely birds most abundant, and almost always in pairs. They occurred from about 2,000 feet elevation up to 5,000 or 6,000 feet. I again met with them in the Lebka valley at very nearly the same elevations, one bird being seen rather lower down at Ain; but individuals were scarce below about 2,000 feet. On the Anseba it was occasionally seen, all the birds noticed being males. The females were probably in July engaged in incubation. I could never find the nest.

Grandala leucogaster keeps much to trees and high bushes, but is occasionally seen on the ground. Its principal food appears to consist of seeds. Dimensions :—

	Wing. in.	Tail. in.	Tarsus. in.
Male	4·2	2·75	0·9
Female	3·9	2·4	0·9

The male is perhaps the handsomest of all the birds met with in Abyssinia. The play of colours in the sunlight from pure azure to deep crimson, and again to copper colour, is most exquisite. Brehm is incorrect in saying that the iris is brown.

FAMILY PYCNONOTIDÆ.

143. Pycnonotus arsinoë (Licht.).

Turdus arsinoë, Licht. Verz. d. Doubl. p. 39.
Ixos arsinoë, Rüpp. Neu. Wirb. p. 83.
Pycnonotus arsinoë, Rüpp. Syst. Uebers. No. 196.

Habits, song, &c. much like those of Indian species. This Bulbul abounds at the base of the hills, and ranges to the highlands. It lives on fruits and buds.

FAMILY ORIOLIDÆ.

144. Oriolus monacha (Gm.).

Turdus monacha, Gmel. Syst. Nat. i. pt. ii. p. 824.—Lath. Ind. Ornith. i. 357.—Id. Gen. Hist. iii. p. 142 (*Nun Oriole*).
O. monacha, Salt, No. 10, App. p. xlvi.
O. moloxita, Rüpp. Neu. Wirb. p. 29, t. xii. f. 1.—Lefebvre, p. 169. —Rüpp. Syst. Uebers. No. 206.
O. monachus, Heugl. Journ. f. Orn. 1868, p. 325.

Iris dull red; beak pinkish brown; legs bluish grey. Not a common bird in the country traversed, and I only obtained two specimens. It has a peculiar harsh double call note. The measurements rather exceed those given by Rüppell. In a female shot near Antalo the wing is 3·5 in., tail 3·9, tarsus 0·8, bill from point 0·8 in.

Rüppell, in the note preceding his description of *O. moloxita*, after mentioning the descriptions of the Abyssinian and South African birds, states that Latham named the latter *O. monachus*, and added the *moloxita* of Buffon, described from Bruce's drawing, as a synonym. Precisely the reverse is the case. Latham, in the "Index

Ornithologicus," i. p. 357, refers to Buffon alone, and it is only in the latter work, the "General History of Birds," that he adds a reference to Le Vaillant's figure. Latham, moreover, as Rüppell ought to have noticed, copies the name from Gmelin, whose *Turdus monacha* is described from Buffon's "*moloxita*, ou Religieuse d'Abyssinie," so that there can be no question of Gmelin's name applying to the species. Von Heuglin's change of the name into *O. monachus* is also inaccurate.

O. monacha is easily distinguished from the black-headed oriole of the Cape, *O. larvatus*, Licht. by the paler colour of the quills, the edges of the secondaries being pale grey instead of white. The bill, too, is shorter and stouter in the northern form.

FAMILY CRATEROPIDÆ, Swainson. (TIMALIDÆ, Bonaparte and Jerdon.)

To this family I most unhesitatingly refer the *Timalinæ* of Indian writers. No one who has seen both in their native state would, I think, have any hesitation on the subject. But besides the African *Crateropi*, the Indian *Malacocerci*, *Timaliæ*, *Garrulaces*, and their allies, I consider that certainly *Drymœca* and *Cisticola*, and probably *Prinia*, *Orthotomus*, and the allied forms should be classed here, and not in the *Sylviadæ*, that *refugium peccatorum* of modern ornithologists. I have stated my reasons elsewhere, and need not repeat them here. The *Crateropi* are very closely allied to the Bush Shrikes, *Telephonus*, *Laniarius*, &c.

145. **Crateropus leucopygius** (Rüpp.).

Ixos leucopygius, Rüpp. Neu. Wirb. p. 82, t. xxx. f. 1.
Crateropus leucopygius, Rüpp. Syst. Uebers. No. 199.
C. limbatus, Rupp. Syst. Uebers. p. 48, and No. 202, p. 60.

Iris orange yellow, almost scarlet; beak black; legs olivaceous.

Occurs in small flocks not exceeding eight or ten in number, constantly employed hunting about on the ground and amongst the branches of trees and bushes for their food, which consists chiefly of insects. These birds fly one after the other from tree to tree, and every now and then, usually when hidden in the middle of a thick bush, burst out in a chorus of chattering, precisely in the same manner as does *Garrulax*. Indeed, the resemblance in general appearance, flight, habits, and voice of these birds to some of the white-headed species of *Garrulax* inhabiting the Himalayas and Burma are most striking, and there is also considerable similarity to some of the *Malacocerci*.

Crateropus leucopygius is found from about 3,500 or 4,000 feet above the sea to 8,000 or 9,000 feet. It was common throughout the highlands on the route traversed. There can, I think, be no question of *C. limbatus* of Rüppell being merely the young of this bird. The two certainly occurred together, and I believe in the same flock.

Dimensions:—Total length about 10 to 10·5 in., wing 4·75, tail 4·5 to 4·75, bill 0·8, tarsus 1·4 in.

146. C. leucocephalus (Rüpp.).

Turdoides leucocephala, Rüpp. Atlas, p. 6, t. iv.
Ixos leucocephala, Rüpp. Neu. Wirb. p. 84.
Crateropus leucocephalus, Rüpp. Syst. Uebers. No. 198.

Iris yellow, with a slight orange tinge; bill black; legs purplish horn-colour.

This species replaces the last below 3,000 feet. It is found up to about 4,000 or 5,000 feet, but was not seen on the highlands. In the Anseba valley at about 4,000 feet, both species were met with inhabiting the same thickets. Their habits are precisely similar.

Dimensions:—Male, length about 9·25 in., wing 4·3, tail 4·75, tarsus 1·4, bill from forehead 0·75. Female, length about 9 in., wing 4·25, tail 4 (perhaps not fully grown), tarsus 1·4, bill 0·75.

147. Malacocercus (*Chatarrhœa*) acaciæ (Licht.).

Malurus acaciæ, Licht. Verz. d. Doubl. p. 40.—Rüpp. Atlas, t. xviii.
Sphenura acaciæ, Rüpp. Neu. Wirb. p. 115.—Syst. Uebers. No. 203.
Argya acaciæ, Heugl. Orn. N. O. Afr. p. 387.

It would be difficult for any one to recognise this bird from Rüppell's figure, which is far too grey. It ought to be very much more rufous. I only obtained one specimen, and I very rarely saw the bird about Zulla. It appeared, so far as I had opportunities of observing, to have precisely the appearance and habits of *Malacocercus caudatus* of India, which is, I think, unquestionably congeneric, being one of the numerous instances in which the forms of the Indian peninsula are closly related to African species.

The measurements of the specimen obtained, a female, are:—Whole length about 10 in., wing 3·8, tail 5·2, tarsus 1·25. The specimen was shot by a collector, and I did not note the colours of the soft parts.

148. **Drymœca gracilis** (Licht.).

Malurus gracilis, Rüpp. Atlas, p. 3, t. ii. b.
Drymoica gracilis, Rüpp. Syst. Uebers. No. 117.—Heugl. Ibis, 1869, p. 91, et Orn. N. O. Afr. p. 242.
? *Burnesia lepida*, Blyth, Journ. As. Soc. Beng. xiii. p. 376, and xvi. 460.—Jerdon, Birds of India, ii. p. 85.
Sylvia gracilis, Licht. Verz. d. Doubl. p. 34.

Iris burnt sienna (orange brown); beak black; legs flesh-colour; tail-feathers 10. Very common amongst the low bushes of the plain country near Zulla.

This bird has the usual hiding, skulking habits of the genus, and consequently it was by no means easy to procure specimens. In general, it is only seen for an instant flying with a weak uncertain flight from one bush to another, which it immediately enters, and is lost amongst the roots and branches. It is always solitary or in pairs, never in flocks. Mr. Jesse found the nest, with two young birds apparently only hatched a few days before, on June 12. It was neatly constructed chiefly of grass, with the entrance at the side, and placed in a hedge which surrounded the Commissariat enclosure.

149. **D. mystacea** (Rüpp.).

Prinia mistacea, Rüpp. Neu. Wirb. p. 110.
D. mystacea, Rüpp. Syst. Uebers. p. 31, t. x.—Ferr. et Gal. No. 62. —Heugl. Ibis, 1869, p. 88; et Orn. N. O. Afr. p. 239.

A solitary specimen, a male, was only obtained of this species also. This was shot on the highlands at Adabagi, two marches south of Adigrat.

Dimensions:—Wing 2·05 in., tail 2·3, tarsus 0·8, bill 0·45, tail-feathers apparently 10, but the tail is rather imperfect in my specimen.

150. **D. pulchella** (Rüpp.).

Malurus pulchellas, Rüpp. Atlas, t. xxxv. fig. a.
Drymoica pulchella, Rüpp. Syst. Uebers. No. 118.—Ferr. et Gal. No. 63.—Heugl. Ibis, 1869, p. 92; et Orn. N. O. Afr. p. 243.

The label of the single specimen obtained has unfortunately been lost, and I have forgotten the exact locality. I believe, however, that the bird was shot in the Anseba valley.

This is by no means a typical *Drymœca*, although it has only 10 tail-feathers. The bill is peculiarly small.

Length of wing 1·85 in., tail 1·7, tarsus 0·65, bill 0·3 in.

151. **D. rufifrons** (Rüpp.).

Prinia rufifrons, Rüpp. Neu. Wirb. p. 110, t. xli. f. 2.
Drymoica rufifrons, Rupp. Syst. Uebers. No. 121.—Ferr. et Gal. No. 61.—Brehm, Habesch, No. 44.—Heugl. Ibis, 1869, p. 87.
Cisticola rufifrons, Heugl. Orn. N. O. Afr. p. 245.

Two or three specimens of this pretty little species were shot, but only one adult preserved. Its habits are unlike those of most of its allies, and greatly resemble those of the little *Prinia gracilis* of India. It is found in small flocks amongst low trees and bushes in the coast country about Annesley Bay. It hides less in thickets near the ground than most of its allies; indeed its habits generally are more those of *Malacocerci* or *Crateropi* than of *Drymœcœ*. It has 12 tail-feathers, but I cannot agree in classing these birds as *Drymœcœ* or *Cisticolœ*, solely with regard to the number of rectrices.

152. Graminicola Le Vaillantii (Smith).

Drymœca Le Vaillantii, Smith, Ill. S. Afr. Zool. Aves, t. lxxiii. f. 2.
Drymœca cantans, Heugl. Ibis, 1869, p. 96.
Cisticola cantans, Heugl. Orn. N. O. Afr. p. 252.

Iris orange-brown.

I only met with this species at Senafé. The tail is imperfect, and I cannot distinctly tell whether it has 10 or 12 rectrices; the latter is probably the correct number. Wing 2·25, tail 2·45, tarsus 0·95, bill 0·5 in. I am indebted to Dr. Finsch for the identification of this bird with the South African form.

This and the two subsequent species belong to one group, for which Jerdon ("Birds of India," ii. p. 177) has proposed the generic name *Graminicola*. It includes several South African species, and one Indian form, *G. bengalensis*. They are, I think, correctly distinguished from both *Cisticola* and *Drymœca*.

153. G. robusta (Rüpp.).

Drymoica robusta, Rüpp. Syst. Uebers. p. 35, t. xiii.—Lefebvre, p. 89.—Heugl. Ibis, 1869, p. 99.
Cisticola robusta, Heugl. Orn. N. O. Afr. p. 254.

The only specimen obtained was killed at Adigrat. It has 12 tail-feathers. Measurement:—Wing 3 in., tail 2·6, tarsus 1·1, bill 0·55 in.

154. G. erythrogenys (Rüpp.).

Cisticola erythrogenys, Rüpp. Neu. Wirb. p. 111.
Drymœca erythrogenys, Rüpp. Syst. Uebers. p. 34, t. xii.—Ferr. et Gal. No. 64.—Heugl. Ibis, 1869, p. 95.
Cisticola erythrogenys, Heugl. Orn. N. O. Afr. p. 250.

Only a single specimen obtained. This also was shot at Senafé. It measures: wing 2·5 in., tail 2·25, tarsus 1, bill 0·5.

155. **Cisticola habessinica** (Heugl.).

Hemipterix habessinica, Heugl. Ibis, 1869, p. 138; et Orn. N. O. Afr. p. 272.

Of this species I obtained a single specimen only, which was shot near Fokada in grass. Its habits and flight resembled precisely those of the common *Cisticola schœnicola.*

The measurements of the specimen obtained, a male, are :—Wing 2·11 in., tail 1·3, tarsus 0·75, bill 0·4, whole length about 4·3 in.

FAMILY SYLVIADÆ.

156. **Oligocercus micrurus** (Rüpp.).

Troglodytes micrurus, Rüpp. Neu. Wirb. p. 109, t. xli. f. 1.
Oligura micrura, Rüpp. Syst. Uebers. No. 115.
Sylvietta brachyura, Lefebvre, p. 89.
Oligocercus micrurus, Heugl. Ibis, 1869, p. 141.
O. rufescens, Heugl. Orn. N. O. Afr. p. 286.

Iris orange-brown, pupil small; legs deep flesh-colour; bill dusky above, pale below.

A most active and lively little bird, constantly hunting about bushes and trees, and often seen running round branches, and even hanging head downwards. In July seen in pairs. It was only met with in the subtropical region, from about 3,000 to 5,000 feet, both in the passes below Senafé and in the Anseba valley. It was not rare in those localities.

157. **Camaroptera brevicaudata** (Rüpp.).

Sylvia brevicaudata, Rüpp. Atlas, t. xxxv. fig. b.
Ficedula brevicaudata, Rüpp. Syst. Uebers. No. 149.
Camaroptera brevicaudata, Brehm, Habesch, No. 45.—Heugl. Ibis, 1869, p. 138; et Orn. N. O. Afr. p. 281.
Syncopta tincta, Cassin. Proc. Ac. Phil. 1855, p. 325.

Iris burnt sienna, pupil small, orbit pinkish brown; legs flesh colour; bill black. In the female the iris is pearl grey, the colour of the plumage duller and more uniform, and the throat whiter.

I never saw this bird in the winter, and I am inclined to suspect that, like *Grandala leucogaster*, it emigrated into the passes during the spring months. In May, it was far from rare at 4,000 to 6,000 feet, and it abounded on the Anseba in July and August. The females were very rarely seen, and I only obtained one. The males were most conspicuous. Perched on the topmost branch of a tree, or some conspicuous spray, they kept up a reiterated monosyllabic call like "tŏŏk-tŏŏk-tŏŏk," repeated at a regular interval. In the stomach I found small insects.

	Wing. in.	Tail. in.	Tarsus. in.
Male	2·3	1·6	1·0
„	2·25	1·55	0·95
Female	2·0	1·5	0·8

From the much shorter tarsus in the only female obtained, I should have thought it belonged to a distinct species, but that it was with a male (also killed). On another occasion, when I saw both together but only succeeded in securing the male, I noticed the paler tinge of the female plumage.

Rüppell's figure and description are probably taken from a hen. *C. tincta* of Cassen is founded on a male bird. Sundevall's *C. olivacea*, to judge from a specimen in the Berlin Museum, is quite distinct, being much greener above.

158. **Phylloscopus abyssinicus**, W. Blanf. (Pl. III. fig. 2).

Ph. Ph. trochili *similis sed supra magis viridescens, subtus isabellinus vix flavescens, cauda longiori.*

	Al. in.	Caud. in.	Tars. in.	Rostr. a fr. in.	Long. tota circa. in.
Mas.	2·5	2·05	0·77	0·36	4·5
Fœmina	2·5	2·05	0·79	0·37	4·5

Common about Mayen in the pass below Senafé, and at Senafé, Halai, and other places on the highlands. It differs from *P. Bonelli*, Vieill. (*S. Nattereri*, Temm.), which it otherwise much resembles, in being pale buff instead silky white below and less brown above. From *P. trochilus* it is distinguished by being more green above and less yellow below. It is very close to the Indian *P. affinis*. It may easily be recognised by its isabelline coloured breast.

The first short primary is above an inch (in one specimen 1·1 in.) shorter than the second, which is nearly ¼ in. shorter than the third. The third and fourth are the same length, the fifth very little shorter.

I obtained several specimens of this little Wren-warbler at Undul Wells and Senafé. I believe it occurs throughout the highlands. I did not meet with it in the Anseba valley.

159. **P. umbrovirens** (Rüpp.).

Ficedula umbrovirens, Rüpp. Neu. Wirb. p. 112 ; et Syst. Uebers. No. 148.—Ferr. et Gal. No. 71.

Phyllopneuste umbrovirens, Heugl. Orn. N. O. Afr. p. 301.

Only a single specimen was obtained ; this was shot at Senafé. The wing measures 2·25 in., tail 1·7, tarsus 0·85. The length of the tail somewhat exceeds that given by Rüppell.

160. Sylvia melanocephala, Gm.

Syst. Nat. i. pt. ii. p. 970.—Heugl. Orn. N. O. Afr. p. 303.
Curruca melanocephala, Rüpp. Syst. Uebers. No. 131.

I shot a single specimen at Rairo in Habab.

161. S. cinerea, Briss.

Rüpp. Syst. Uebers. No. 133.—Heugl. Orn. N. O. Afr. p. 307.

Not rare in Samhar near Massowa in the middle of August.

162. Hypolais languida, Hempr. and Ehr.

Curruca languida, Hempr. and Ehr., Symb. Phys.—Heugl. Orn. N. O. Afr. p. 296.

From comparison with the type specimen in the Berlin Museum I have ascertained that this is identical with Hemprich and Ehrenberg's bird. I shot specimens in the Lebka valley and Samhar. It has precisely the habits of the Indian *Acrocephalus dumetorum* of Blyth, living amongst thick bushes and hunting about the branches for insects, uttering every now and then a sharp cry like "tchick-tchick." It is a restless active little bird. The dimensions of a pair are :—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
Male	3·0	2·45	0·86	0·53
Female	3·05	2·52	0·85	0·55

The colour scarcely differs perceptibly from that of the next species. The first primary extends about $\frac{1}{3}$ in. in one specimen, $\frac{1}{2}$ in. in the other, beyond the under wing-coverts, and is very pointed; the second is $\frac{1}{8}$ in. shorter than the third, which is the longest.

163. H. elaica (Lindermayer).

Salicaria elaica, Linder. Isis, 1843, pp. 342, 343.

This is a much smaller bird than the last, easily distinguished by the larger first primary, which is rounded, not pointed, at the end.

Measurements :—Wing 2·6 in., tail 2·1, bill 0·47, tarsus 8·5 ; the first primary is 0·6 in. long outside the under wing-coverts, and twice as broad as in the last species ; second primary 0·2 in. shorter than the third, which is the longest.

r64. Aedon galactodes, Temm.

Sylvia galactodes, Temm. Pl. Col. 251, f. 1.
A. minor, Cab. Mus. Hein. i. p. 39.—Brehm, Habesch, No. 48.
Aëdon galactodes, Heugl. Ibis, 1869, p, 84 ; et Orn. N. O. Afr. p. 276.

Common from the base of the hills to about 3,500 or 4,000 feet, but not seen above. In the winter (January and February) it was only seen at the base of the ranges ; in May it was common as high as Mayen, about 3,500 feet. It appears to be confined to the tropical region.

Family ALAUDIDÆ.

165. Motacilla alba, L.

Rüpp. Syst. Uebers. No. 173.—Heugl. Orn. N. O. Afr. p. 316.
? *M. dukhunensis*, Sykes, P. Z. S. 1832, p. 91.

Common both on the highlands and near the coast. I cannot see that the specimens collected by me in Abyssinia show the slightest difference from others shot in Western India, and belonging to the supposed species *M. dukhunensis*, Sykes.

On the 1st of May there were still specimens on the highlands around Lake Ashangi, but only very few remained. A month earlier they had been numerous.

166. **M.** (*Calobates*) **sulphurea** (Bechst.).

Motacilla sulphurea, Heugl. Orn. N. O. Afr. p. 318.

Not common. I only killed one specimen, which I obtained in the Lebka valley in August.

167. **Budytes melanocephala** (Licht.), or *B. flava*, L. var. *melanocephala*.

Motacilla flava melanocephala, Heugl. Orn. N. O. Afr. p. 321.
Motacilla melanocephala, Licht. Verz. der Doubl. p. 36.—Rüpp. Atlas, t. xxxiii. b.; et Syst. Uebers. No. 178.

Common everywhere during the winter, and I suspect many remain and breed on the highlands of Abyssinia, for birds of this species were still abundant around Lake Ashangi at the beginning of May, although they had then assumed the nuptial plumage more than a month.

The Yellow Wagtails pass gradually into each other, and are considered by many of the best ornithologists, as Tristram and Finsch, as merely varieties of one species, *B. flava*, L.

Specimens of *B. melanocephala* killed in December and January are perfectly indistinguishable from the Indian specimens generally assigned by Jerdon and others to *B. viridis*, Gm.

168. **B. cinereocapilla**, Savi.

? *B. flava*, L. Rüpp. Syst. Uebers. No. 176.
Motacilla flava cinereoscapilla, Heugl. N. O. Afr. p. 321.

A single specimen in breeding plumage was shot at Lake Ashangi at the beginning of April. It is intermediate between the var. *cinereoscapilla* and true *flava*, as it has only a trace of a white superciliary stripe.

169. **B. campestris,** Pallas, or *B. flava,* L. var. *campestris*?

A single specimen obtained on the highlands in spring has the forehead and greater portion of the crown of the head yellow. Mr. Tristram informs me that he has seen but one other specimen with an equally yellow head. That was shot in England. I am informed by Dr. Finsch that this race is the true *Motacilla campestris* of Pallas, and that *M. Rayi* of Linnæus differs by having the crown greenish and well-marked yellow supercilia. Mr. Tristram, however, does not consider that this is Pallas's bird. I confess myself unable to decide anything with respect to these races.

170. **Anthus cecilii,** Savigny.

Sav. Descr, de l'Egypte, Explic. somm. des Planches, p. 281.—Ois. pl. 5, f. 6, 1825.
Motacilla cervina, Pallas, Zoogr. Ros. As. i. p. 511, 1831.
Anthus cervinus, Heugl. Orn. N. O. Afr. p. 323.

Common around Senafé on ploughed fields.

171. **Anthus** (*Agrodroma*) **sordidus,** Rüpp. or *A. campestris,* var. *sordidus.*

Anthus sordidus, Rüpp. Neu. Wirb. p. 103, t. xxxix. f. 1.—Heugl. Orn. N. O. Afr. p. 326.

This bird varies much, apparently with age and the state of the plumage. Some specimens are almost uniformly dusky above, with part of the outer tail-feathers alone pale buff, and only a trace of pale edgings to the quills and wing-coverts. This is the plumage of two specimens shot in the Anseba valley in July. All the specimens shot on the highlands in the winter and spring are more rufous, and have more or less broad rufous margins to the tail-feathers, quills, and wing-coverts. The greater portion of the outer tail-feathers and a portion of the next pair are whitish in colour, the centres of the latter being usually dusky. The coloration of the underparts also varies slightly. In some birds the breast is distinctly spotted; in others there is not a trace of spots. Mr. Tristram, who has kindly examined my specimens, considers that all the varieties belong to one species, and I am quite disposed to agree. There is great variation in dimensions. I give those of all the specimens collected, five in number:—

	Wing.	Tail.	Tarsus.	Total length (about)	Bill.	
	in.	in.	in.	in.	in.	
Anseba .	3·8	3·2	1·05	6·75	0·65	Male, dusky.
„ .	3·5	3·0	1·0	6·5	0·6	Female, „
Senafé .	4·0	3·4	1·0	7·0	0·56	Male, „
„ .	3·9	3·2	1·05	7·0	0·65	Female, more rufous.
„ .	3·55	2·5	1·05	5·75	0·56	Young, very pale.

It is just possible that the last specimen, which is entirely without spots on the breast, should be referred to *A. campestris*, L., but I am disposed to consider it a young specimen of *A. sordidus*.

Anthus sordidus keeps much to rocky hill-sides, where there is but little bush. It was common near Senafé, and equally so on the more barren hills bordering the Anseba valley. It sometimes perches on trees.

172. A. (*Agrodroma*) campestris ?

Anthus campestris, Heugl. Orn. N. O. Afr. p. 325.

Only seen on the highlands. There it was everywhere abundant on grassy meadows. *A. cervinus* appeared to replace it on cultivated land.

It is quite impossible in the series preserved by me to distinguish this species from the last. As a rule *A. campestris* is a smaller bird, brighter and more rufous in colour above, and paler beneath, with a distinct spotted breast. The bill is conspicuously smaller. But not one of these characters can be relied upon. I append measurements of specimens, by comparing which with those of the last species it will be seen that there is complete gradation, and the colour also varies :—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.	
Female	3·75	2·7	1·1	0·53	Senafé
Male	3·55	2·65	1·1	0·57	Adigrat
Female	3·5	2·65	1·07	0·6	Ashangi
„	3·4	2·6	1·05	0·54	„

The first two should perhaps rather be classed in *A. sordidus*, but it is simply impossible to draw a distinct line.

173. **Macronyx flavicollis**, Rüpp.

Rüpp. Neu. Wirb. t. xxxviii. fig. 2.—Heugl. Orn. N. O. Afr. p. 330.

Iris brown; bill black above, bluish grey below; legs brown.

In habits and flight this bird is rather a Pipit than a Lark, and it wants the rudimentary first primary quill, though its bill and feet are Lark-like. It was only seen on the highest part of the Dalanta plateau, and near the crest of the Wandaj pass, and was never observed below 10,000 feet. It was not common, but occurred generally in pairs ; sometimes three were seen together.

Measurements taken in the flesh: whole length 6·75 in., closed wing 3·85, tail 2·12, tarsus 1·12, hind toe 0·5, claw 0·3, bill in front 0·5 in.

174. **Certhilauda desertorum** (Stanley).

Alauda desertorum, Stanley, Salt's Journey, App. p. lx.
Certhilauda desertorum, Rüpp. Syst. Uebers. No. 304.
Alæmon desertorum, Heugl. Journ. f. Orn. 1868, p. 230.

Rather common about Zulla, but comparatively rare near Massowa. The flight of this bird did not appear to me at all Plover-like; it was certainly not the least similar to that of other Larks; but although more rapid, there was something in the mode of flight which always reminded me of a Hoopoe, and the two conspicuous white wing bands greatly increased the resemblance. It is not a wary bird, but when running it is very swift. It keeps to comparatively open spots, and is usually solitary or in pairs. I only once saw three together, and then two appeared to be young birds.

The bill varies much in length, and appears to be longest in the male. I append measurements of four specimens:—

	Wing. in.	Tail. in.	Bill. in.	Tarsus. in.
1. Male	5·0	3·8	1·1	1·3
2. „	4·8	3·6	1·0	1·22
3. Female	4·3	3·2	0·85	1·22
4. „	4·25	3·0	0·85	1·3

Much doubt appears to overshroud the synonomy of this bird. It was originally described by Lord Stanley, from a specimen brought by Mr. Salt from Amphila, on the Abyssinian coast, and was characterised as greyish sandy brown. A more rufous race inhabiting Nubia, which passes into the grey one by imperceptible degrees, is the type of *A. bifasciata*, Licht. I do not intend to enter at length into the question of the identity or distinctness of these two races, but merely to show that if they are to be distinguished, the name *desertorum* must be retained for the greyer form, found on the shores of the Red Sea and in Arabia, and *bifasciata* for the more rufous race which is found in Nubia. Latham's Desert Lark ("Gen. Hist." vol. vi. p. 301), as was pointed out to me by Dr. Finsch, seems to apply to the *bifasciata* type, as the head, neck, and back are said to be dun or brownish buff colour, and the specimen, although stated to be in the collection of Mr. Salt, can scarcely have been the same as the type described by Lord Stanley. The synonymy will be:—

CERTHILAUDA (*Alauda*) DESERTORUM, Stanley, loc. cit.—Heugl. No. 183.—Faun. d. Rothen Meer.—Peterman's Mitth. 1861. —Ibis, 1859, p. 343.—Journ. f. Orn. 1865, p. 230.

C. bifasciata, Gould, B. Europe, pl. 168.

(This is a somewhat intermediate variety.)

C. Salvini, Tristram, Ibis, 1859, p. 57.

CERTHILAUDA (*Alauda*) BIFASCIATA, Licht. Verz. d. Doubl. p. 27. —Rüpp. Atlas, t. v.—Temm. Pl. Col. 393.

C. desertorum, Stanley, apud Latham, Gen. Hist. vi. p. 301.—Rüpp. Syst. Uebers. p. 78, No. 304.—Heugl. Syst. Uebers. No. 438.— ? Jerdon, Birds of India, ii. p. 438.

? *Saxicola* ? *pallida*, Blyth, Journ. As. Soc. Bengal, xvi. p. 130.

(This also appears somewhat intermediate, and Jerdon notices that an Indian specimen is darker than that figured by Rüppell.)

My specimens, all from the same locality, show great variation in the amount of spotting on the breast, though all have far more than Nubian specimens. The relative extent of the two white bands, and the intervening dusky space on the secondary quills, are also marvellously inconstant, and even the colour of the back varies somewhat. Some specimens from Arabia in the Berlin Museum have the breast even darker and more thickly spotted than in the birds from Annesley Bay. There are also amongst the very fine series in that museum decided traces of a passage from the grey *C. desertorum* to the rufous *C. bifasciata*, and as none of the characters which at first sight distinguished the two appear to be at all constant, even in birds from the same locality, I should be disposed to unite the two races.

175. **Alauda** (*Galerita*) **cristata**, L.

G. lutea, Brehm, Habesch, No. 97.—Rüpp. Syst. Uebers. No. 309. —Heugl. Journ. f. Orn. 1868, p. 233.
? *Galerida isabellina*, Bon. Consp. p. 242.

Common near the coast. I can see no difference between specimens from the Red Sea and others from India, and do not understand why Bonaparte proposed to separate them.

I obtained at Zulla an albino specimen of this bird of pale isabelline colour, without any dark marks either on the back or breast.

176. **A.** (*G.*) **arenicola**? Tristram, var. *fusca.*

Ibis, 1859, p. 58.

I obtained a single specimen of a very dark-coloured Lark on the Abyssinian highlands at Ashangi, which I was inclined to refer to *G. abyssinica*, Bon., although its dimensions are much smaller.

Wing	Tail.	Bill.	Tarsus.
in.	in.	in.	in.
4	2·3	0·65	1·05

Mr. Tristram, however, informs me that it agrees in everything except colour with his *G. arenicola.*

177. Alauda prætermissa, W. Blanf. (Plate VI.).

Ann. and Mag. Nat. Hist. Nov. 1869.

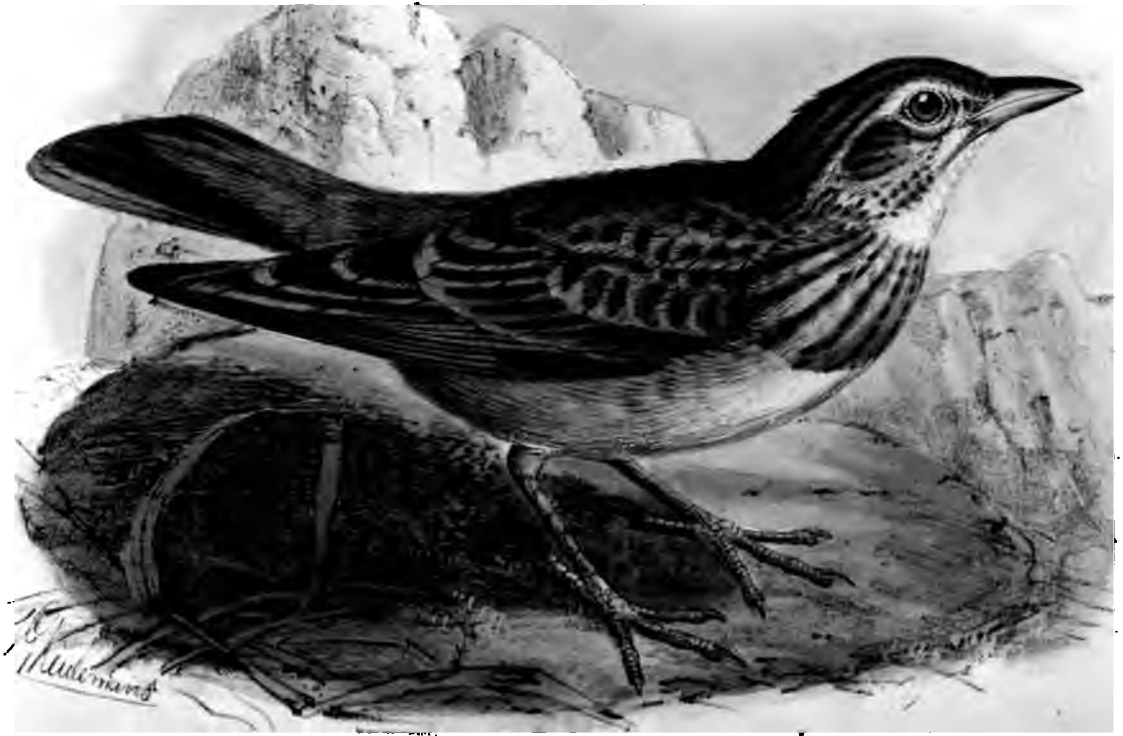
A. supra fusco-umbrina, capitis, colli postici, interscapuliique plumis late et pallide rufescenti marginatis, dorso posteriori magis cinerascenti, vix striolato; superciliis et gastreo toto isabellinis; genis, colli lateribus, pectoreque saturatioribus et fusco-guttatis, regione paroticâ fuscescenti; remigibus et tectricibus alarum umbrinis, primariis extus isabellino secundariis tectricibusque rufo-marginatis, remigibus omnibus intus versus basin rufo-fulvis; uropygio et rectricibus medianis rufescenti-umbrinis, rectricibus exteris pogoniointerno basin versus exceptis et pagoniis externis secundarum rufo-isabellinis, cæteris cum partibus reliquis externarum fumoso-nigricantibus. Caput subcristatum, rostrum supra fuscum, subtus pallidum, pedes carnei irides brunneæ.

	Long. alæ.	Caud.	Tars.	Ung. post.	Rost. a fr.	Tota circa.
	in.	in.	in.	in.	in.	in.
Dimensiones avis maris .	3·9	2·15	1·0	0·45	0·5	6·25
„ „ fœminæ	3·7	2·0	1·0	0·4	0·5	6·0

The first primary is ½ to $\frac{7}{10}$ inch in length, the second very little shorter than the third, which is nearly equal to the fourth.

I found this to be the common Skylark around Senafé and Adigrat, with precisely the habits of the European bird. It is distinguished by the bill being stronger and the wing decidedly shorter. I cannot find any description agreeing with it amongst the birds included in Von Heuglin's lists; and as Mr. Gray, Dr. Finsch, and

Pl. VI



[illegible]

ALAŪDA PRÆTERMISSA. W Blanf

[illegible]

Mons. Jules Verreaux all agreed with me in considering it new, I described it as such. Mr. Tristram considers it a form of *Galerita cristata,* in which I cannot coincide; the nearest described species is probably *Alauda erythropygia* of Strickland (P. Z. S. 1850, Aves, pl. xxiv.), but the present form is smaller, and the rufous colouring on the tail-feathers is differently distributed.

178. **Calandrella brachydactyla** (Temm.).

Rüpp. Syst. Uebers. No. 306.—Heugl. Journ. f. Orn. p. 232.

Not rare on the shores of Annesley Bay. I did not meet with it in the highlands.

179. **C. Anderssoni** (Tristram). M.S. Ibis, 1869, p. 434.

Closely allied to *A. cinerea,* Latham (*A. ruficeps,* Rüpp.), but smaller, and without the black spot at the side of the neck. Mr. Tristram informs me that he considers it distinct, and has named it after the South African Naturalist, who discovered it also in Damara Land.

This bird is unquestionably a *Calandrella,* and perfectly congeneric with the last species, which it probably replaces on the Abyssinian highlands, both in form and habits.

I found this small Lark abundant on stony ground near Senafé, keeping much in large communities, and highly social, precisely like *C. brachydactyla.*

A male specimen measures: wing 3·25 in., tail 2·1, tarsus 0·8, hind claw 0·35, bill from front 0·4 in.

180. Ammomanes deserti (Licht.).

Alauda deserti, Lichtenstein, Verz. d. Doubl. p. 28.
A. isabellina, Temm. Pl. Col. 144, f. 2.
Melanocorypha isabellina, Rüpp. Syst. Uebers. No. 306.
Ammomanes deserti, Heugl. Journ. f. Orn. 1868, p. 226.

Not rare to the west and north-west of Massowa, in rocky and stony ground, amongst thin bushes.

A specimen measures: wing 3·7 in., tail 2·5, tarsus 8·7, bill from nostril to point 0·42 in.

181. Pyrrhulauda melanauchen, Cab.

Coraphites melanauchen, Cabanis, Mus. Hein. i. p. 124.—Heugl. Journ. f. Orn. 1868, p. 219.
Pyrrhulauda crucigera, Rüpp. Syst. Uebers. No. 313.—Brehm, Habesch, No. 101.

Extremely abundant in all the sandy country near the coast. These birds, like other species of the genus, are true Larks and not Finches in all their habits: they always live on the ground, very rarely indeed, if ever, perching on bushes; they are social, several keeping about one spot, but they do not exactly associate in flocks, and when disturbed rise one after the other, not simultaneously, and fly off without keeping close to each other. In the middle of the day several may be seen together in the shade of a tree or a bush. They run, too, and do not hop, and their flight is lark-like. Altogether, considering their flight, habits, and plumage, there can be no question that they are true Larks and not Finches, and the presence of a small first primary confirms this position.

The following are the measurements of a pair :—

	Wing. in.	Tail. in.	Bill from front. in.	Tarsus. in.
Male, Zulla, Annesley Bay . .	3·05	1·95	0·4	0·7
Female, Massowa	3·1	1·95	0·41	0·75

The outer rectrices in both sexes are isabelline nearly throughout; the margins of the second pair and the tips of the remainder are the same, the colour decreasing towards the middle.

182. **P. albifrons** (Sund.).

Coraphites albifrons, Sund. Ofvers. k. Vet. Akad. Forb. 1850, p. 127.
"*P. frontalis*, Licht," Bon. Consp. Gen. Av. i. 512.
C. nigriceps, Heugl. Journ. f. Orn. 1868, p. 218.

Some of the specimens obtained by me appear to belong to this species, from which the last is but doubtfully distinct. I cannot find the original description by Lichtenstein, but the species is by Cabanis ("Journ. f. Orn." 1868, p. 219, note) said to be distinct from *C. nigriceps*, Gould. This is probably the case, judging from Gould's description ("Voy. *Beagle*," Birds, p. 87), in which the *C. nigriceps* from the Cape Verde Islands is said to have the centre of the back-feathers dark, and a white line on each side of the breast, neither of which characters are found in the East African form: the dimensions of the latter are also slightly larger. Sundevall's name, dated May 1850, has priority over Lichtenstein's if the latter was not published before given to the world in Bonaparte's "Conspectus," as the portion containing it bears date, August 1850. The name does not occur in the "Verz. d. Doubletten."

As I did not discriminate between the two races amongst the numerous specimens of this bird which I brought from Abyssinia, I am inclined to suspect that they pass into each other. In the only adult male specimen now before me, which I refer to *P. frontalis*, the ears are grey and the cheek-patch not separated by a black line from the grey of the back. In a younger specimen the ears are white; the white of the forehead is much less extended. In both birds the rectrices have no pale margins. In a female, which I refer also to this species, the outer rectrices have the greater portion of inner web blackish brown; the outer web, with part of the inner, and the outer edges of the second pair, are isabelline. The following are the measurements:—

	Wing.	Tail.	Bill.	Tarsus.
	in.	in.	in.	in.
Male, Zulla	3·0	1·95	0·37	0·65
Do. young, Amba, Samhar	3·0	1·9	0·4	0·62
Female, Zulla	2·95	1·8	0·35	0·67

183. P. leucotis (Stanley).

Loxia leucotis, Stanley, Salt's Journey, App. p. lx.
Pyrrhulauda leucotis, Rüpp. Syst. Uebers. No. 314.
Coraphites leucotis, Heugl. Journ. f. Orn. 1868, p. 217.

Iris raw sienna; beak white; legs flesh colour.

This Lark inhabits the same localities as the last, and associates with it, so that I have killed specimens of both with one shot. It is, however, far less abundant. Dimensions:—

	Wing.	Tail.	Bill.	Tarsus.
	in.	in.	in.	in.
Male	3·0	1·9	0·35	0·6
Female	3·1	2·0	0·35	0·65

FAMILY CORVIDÆ.

184. Corvus affinis, Rüpp.

Neu. Wirb. p. 20, t. x. f. 2; Syst. Uebers. No. 239.—Tristram, Ibis, 1866, p. 72.—Heugl. Journ. f. Orn. 1868, p. 316.
Corax affinis, Brehm, Habesch, No. 79.

Iris dark brown; bill and legs black.

This Crow has been well described by Tristram (loc. cit.). In the air it may immediately be recognised by its short tail and long secondary quills, and its croak is much deeper than that of most Crows. It abounds everywhere on the highlands and in the subtropical zone, and it descends almost to the sea-level at times. When I first visited Komayli, at the base of the hills, in January, the only Crow to be seen was *C. scapulatus*, but in February, after some rain had fallen, *C. affinis* abounded. In the former instance I first met with this species at about 3,000 feet, near Mayen. In May it had retreated once more to its former range, and the white-breasted Crow alone was to be seen in the tropical region. In ascending to the Bogos country it first appeared on the Lebka at about 12,000 feet above the sea, at Ain.

185. C. scapulatus, Daud.

Daudin, Traité complet d'Orn. ii. p. 232.—Lefebvre, p. 105.—Rüpp. Syst. Uebers. No. 238.—Heugl. Journ. f. Orn. p. 313.

The distribution of this species is most remarkable. It was common near the coast, and was always found in smaller or larger numbers about Zulla, Komayli, &c., but not further up the passes. In ascending the Lebka valley, N.W. of Massowa, it only appeared as far as about 3,000 feet above the sea, near Kelamet. Throughout Tigré and in the Anseba country I never once saw it. When, therefore, I came upon a Crow with a white collar on the top of the Wadela and Dalanta plateaux, close to Magdala, at an elevation exceeding 9,000 feet, I confidently expected that it must prove a distinct species, and it was only after most careful comparison that I became satisfied of its perfect identity with the form so common on the coast.

This Crow has a harsh deep croak, but less deep than that of *C. affinis.*

The following are measurements taken from four specimens :—

	Length about in.	Wing. in.	Tail. in.	Tarsus. in.	Bill to gape. in.
Male, Habat . . .	21	14·5	8·0	2·5	2·3
„ Zulla	21	14·25	8·0	2·5	2·4
„ Wadela . . .	20	15·0	9·4	2·5	2·3
Female „ . . .	18	14·25	7·75	2·5	2·15

186. Corvultur crassirostris (Rüpp.).

Raven, Bruce, vol. v. p. 153.
Corvus crassirostris, Rüpp. Neu. Wirb. p. 18, t. viii.
C. albicollis, Lefebvre, p. 104.
Corvultur crassirostris, Rüpp. Syst. Uebers. No. 142.—Heugl. Journ. f. Orn. 1868, p. 317.

Iris very dark brown ; bill and legs black.

Common in places on the higher portions of the highlands, but locally distributed. I first saw it at Fokada, two marches south of Senafé, again about Dolo and other camps a little north of Antalo, and again abundantly in the Wadela plateau. At Yasendyé, three marches from Magdala, all three species of Crows occurred.

Corvultur crassirostris has a deep guttural croak, and appears to be more exclusively carrion-feeding in its habits than other species. I always saw it associating with Vultures near carcases. It flies heavily, expanding its tail much. Other Crows (*C. affinis*) pursue and tease it, just as they do Lammergeyers, Eagles, and other birds of prey.

Fregilus graculus I met with once on the Wadela plateau, near Gaso, at an elevation of 10,500 feet, but I did not secure a specimen. There was a small flock, not very wary; indeed I approached so near that I could only account for my not killing a bird by my cartridges being damp. They appeared to be searching for insects on the ground.

FAMILY STURNIDÆ.

187. **Lamprocolius chalybæus** (Hemp. and Ehr.).

Lamprotornis chalybæus, Hemp. and Ehr., Sym. Phys. t. x.—Rüpp. Syst. Uebers. No. 242.—Heugl. Journ. f. Orn. 1869, p. 5.
L. cyaniventris, Blyth, Journ. As. Soc. Bengal, 1855, p. 255.
L. chalybæus and *L. abyssinicus*, Hartlaub, Journ. f. Orn. 1859, p. 21.

Iris golden yellow, sometimes orange or scarlet near the pupil.

This bird varies greatly in size, so much so that it is not at all surprising that two races should have been distinguished. But despite the great differences in the specimens obtained, amounting to 1½ inches in the length of the closed wing, I am unable to see any constant distinction, there being numerous specimens of intermediate size. The following series of measurements will illustrate this :—

	Wing. in.	Tail. in.	Bill at front. in.	Tarsus. in.
1. Haik-hallat, near Antalo .	5·9	4·2	0·75	1·25
2. Kokai, Lebka valley, Hahab	5·8	4·0	0·7	1·3
3. Musga, near Antalo . . .	5·3	3·5	0·7	1·2
4. Lake Ashangi	5·15	3·5	0·6	1·3
5. Anseba valley	4·75	3·0	0·6	1·3
6. Aclat, Samhar	4·6	3·2	0·6	1·15
7. „ (a young bird) . .	4·2	1·6	0·55	1·1

It is very difficult, if not impossible, to draw a line here. The type specimens of *L. cyaniventris*,[1] Blyth, in the Indian Museum at Calcutta, which I have examined, belong to the larger race, to which indeed all, or almost all, of the numerous specimens obtained on the table-land may be referred, the skin from Lake Ashangi (No. 4 of the above table) being the smallest preserved; whilst the few specimens from the low country are much smaller. Both varieties were found on the Anseba. The iris in the large variety appeared to be more orange, but this is very possibly a difference depending upon age.

Lamprocolius chalybæus was not seen in the passes or at Senafé in January, February, or March. It was occasionally met with, as at Fokada, Dongolo, and Lake Ashangi, on the march to Magdala, but usually at this season appeared confined to lower levels. In May, however, it was abundant about Senafé and throughout the upper part of the passes, and it was also met with commonly in July in the Anseba valley, and even at the base of the hills near Ailat, but it was not observed in the coast region. I obtained birds in the young plumage figured by Rüppell in July.

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[1] This name is prior by four years to that of *L. abyssinicus;* and if the two races be kept distinct, as is done by Von Heuglin, must be adopted for the larger one.

This bird has very much the flight and habits of the common Starling.

188. L. chrysogaster (Gm.).

Turdus chrysogaster, Gm. Syst. Nat. i. pt. ii. p. 835.
Lamprotornis rufiventris, Rüpp. Neu. Wirb. p. 27, t. xi. f. 1; Syst. Uebers. No. 247.
Notauges chrysogaster, Cab. Mus. Hein. i. p. 198.—Hartlaub, Journ. f. Orn. 1859, p. 26.—Heugl. Journ. f. Orn. 1869, p. 9.

Iris yellowish white; legs and bill black.

This species was never observed on the highlands or to the south of Massowa, but it was common about Ailat, Ain, &c. at the base of the hills, and in the Lebka and Anseba valleys, usually occurring in small companies or flocks, and feeding on the ground on insects, not unfrequently in company with *L. chalybæus*, which it greatly resembles both in flight and habits. Measurements:—

	Wing. in.	Tail. in.	Bill. in.	Tarsus. in.
Male from Ailat	4·5	2·85	0·75	1·25
Female, Anseba valley . . .	4·4	2·9	0·65	1·25

189. Lamprotornis purpuroptera, Rüpp.

Syst. Uebers. No. 251, p. 64, t. xxv.—Hartlaub, Journ. f. Orn. 1859, p. 11.—Heugl. Journ. f. Orn. 1860, p. 2.
L. æneus, Brehm, Habesch, No. 82.

Iris yellow white; legs and bill black.

Only seen in the Anseba valley, where it was abundant, and often observed associating with *Lamprocolius chalybæus* and *L. chrysogaster*, especially about villages and cattle enclosures. It was occasionally seen hawking insects in the air, as was also *L. chrysogaster.* It appears, however, to be also frugivorous at times. More than three or four were seldom seen together. Dimensions of three specimens :—

	Wing. in.	Tail. in.	Bill. in.	Tarsus. in.	Total length about in.
1. Male	6·75	8·6	0·75	1·6	14·0
2. „	6·7	8·2	0·8	1·6	13·8
3. Female	6·65	8·3	0·75	1·6	14·0

L. ænea has black spots on the wing-coverts, and the back greenish. This bird has unspotted wing-coverts and a purple beak, and the measurements are different. The specimens obtained greatly exceed Rüppell's types of *L. purpuroptera* in size, the bill, wings, and tail being all much larger than the specimens in the British Museum. But the coloration is identical, while that of *L. ænea* is quite distinct.

190. Amydrus Rüppelli, Verreaux.

J. Verr. Chen. Encycl. d'Hist. Nat. Ois, v. p. 166.—Hartlaub, Journ. f. Orn. 1859, p. 31.—Heugl. Journ. f. Orn. 1869, p. 12.
Lamprotornis morio, Rüpp. Neu. Wirb. p. 26 ; Syst. Uebers. No. 252.

Iris red ; bill and legs black.

This race abounded around Senafé and elsewhere in Tigré. I did not notice any *Amydri* in Lasta. As a rule these birds kept to the highlands, at about from 7,000 to 8,000 feet, but I shot one specimen in May as low as Suru, barely 2,000 feet above the sea. The following measurements are taken from four specimens of each sex :—

	Wing in.	Tail. in.	Bill. in.
Male	6·5	6·25 to 6·5	1·1 to 1·15
Female . . .	6·12 to 6·25	6·25	1· to 1·05

All the three species of *Amydrus* collected by me appeared to be mainly if not entirely frugivorous, living chiefly on the fruits of various kinds of *Ficus*, of *Juniperus procera*, &c. They also occasionally feed on the ground on seeds. They roost at night amongst rocks in large communities.

191. **A. Blythii**, Hartl.

Hartlaub, Journ. f. Orn. 1859, p. 32.—Heugl. Journ. f. Orn. 1869, p. 14.
A. Rüppelli, Blyth, Journ. As. Soc. Beng. 1836, p. 300.

This appears to be a fairly distinguishable race so far as my specimens show. It has, I believe, never been brought to Europe before, the only known examples being in the Museum of the Asiatic Society of Bengal at Calcutta, brought by Captain Speke from Somali land. The female differs more conspicuously from *A. Rüppelli* than the male does; for in *A. Blythii* the whole head and neck are ashy grey, the colour terminating abruptly, and not passing into the black of the neck and breast, whilst in *A. Rüppelli* the feathers have black centres, which increase in size below until all become black. Both sexes of *A. Blythii* are larger, but with a smaller bill, than *A. Rüppelli*. In the former species also the dusky tips to the chestnut primary quills are larger and more marked, on the first primary especially; nearly two inches of the inner web and from two and a half to three inches of the outer web are entirely dusky; whilst in *A. Rüppelli* all near the centre is rufous.

As this race appears never to have been described from an actual specimen, for even Heuglin only saw it, and failed to secure examples, I add the following:—

A. Blythii, Hartl.—*A. similis* A. Rüppelli *sed major, rostro breviori, colore fusco ad apices remigum magis extenso capite colloque fœminæ pure cinereis, haud nigro strigatis.*

	Long. alæ. in.	Caudæ. in.	Rostri a fr. in.	Tarsi. in.	Tota circa in.
Maris dimensiones .	7·0 ad 7·25	7·5 ad 8·25	0·9 ad 1·0	1·55	15·5
Fœminæ „ . .	6·37 „ 6·75	6·67 „ 7·25	0·9 „ 0·95	1·5	14·5

Amydrus Blythii abounded around Mayen at an elevation of from 3,000 to 4,000 feet in the pass below Senafé. In January and February they were frequently met with in flocks, which were often seen flying around the rocks, their red wings flashing conspicuously in the sun. I once found a great roosting-place, where evidently large numbers from all quarters collected at night. It was in a ravine, where, owing to the presence of a band of hard rock, the watercourse made a sudden descent, and here even in the dryest season a very small quantity of water trickled over the rocks. As in many similar places where water trickled down the face of a steep cliff, a large deposit of calcareous tufa had taken place, and, probably owing to the subsequent wearing action of the torrent, which in rainy weather rushes down the ravine, had been so excavated as to form an overhanging cliff, beneath which these birds took up their abode at nightfall in great numbers, clinging to the rock. The water also attracted numerous *Cynocephalus hamadryas* Monkeys, and a few Pigeons and other birds; the principal inhabitants, however, being the Monkeys and *Amydri*, and the noise produced by the two was deafening, especially whenever a shot was fired.

192. A. albirostris (Rüpp.).

Ptilonorhynchus albirostris, Rüpp. Neu. Wirb. p. 22, pl. 10, f. 1, 2; Syst. Uebers. No. 244.
Ptilorhinus albirostris, Cab. Mus. Hein. i. p. 201.—Hartl. Journ. f. Orn. 1859, p. 30.—Heugl. Journ. f. Orn. 1869, p. 12.

Iris deep coppery red, a darker ring round the pupil; bill white; legs black.

To separate this bird generically from the last, as is done by many ornithologists, on account of its plumed nares, is simply absurd, when in every other detail of plumage, even to the minutiæ of colouring in both sexes, in flight, and in habits the two are so closely allied. Precisely like *A. Rüppelli*, the present bird is social, lives on fruits, and roosts in large communities amongst rocks. It was only seen on the highlands, and was particularly common in the neighbourhood of Senafé.

193. Buphaga erythrorhyncha (Stanley).

Tanagra erythrorhyncha, Stanley, Appendix to Salt's Journey, App. p. lix.
B. habessinica, Hemp. and Ehr., Symb. Phys. t. ix.
B. erythrorhyncha, Rüpp. Syst. Uebers. No. 254.

Iris scarlet, orbit yellow; bill within and without, and tongue, bright scarlet, dusky in the young; feet dusky.

The habits of this bird are well known. It usually abounds wherever cattle are to be met with, and perches on oxen, mules, or camels, running over their backs, and

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up and down their sides, searching for parasites, especially *Ixodes*, on which it feeds, and frequently appearing to defy the attempts of the animal to induce it to leave. The number of ticks which assail both wild and domestic animals in Abyssinia, especially in the rainy season, is astonishing; not even the thick hard hide of the Rhinoceros is proof against them, though the species found upon him appears to be peculiar. I did not, however, notice this bird on a Rhinoceros, or any other wild animal.

Buphaga erythrorhyncha is found both on the highlands and near the coast. It is more abundant in the former. The noise is much like that of a Starling or *Myna*.

194. **Textor alecto**, Temm.

Temminck, Pl. Col. 446.—Rüpp. Syst. Uebers. No. 257.—Heugl. Journ. f. Orn. 1867, p. 366.

Legs dusky, horn-coloured; bill black, the basal portion in adults (males) only covered with a fleshy cere, pale yellow in colour.

I saw this bird only on the Anseba. It is quite starling-like in its habits and flight, and belongs, I think, to this family rather to the *Fringillidæ*. I frequently saw it associating with *Lamprotornis æneus*, *Lamprocolius chalybæus*, and *L. chrysogaster*, hunting for insects on the ground, especially about cattle-pens. The massive nests are not unlike those of *Sturnopastor contra*. All which I saw were in high acacia-trees, but the breeding season was over long before July.

FAMILY FRINGILLIDÆ.

195. Hyphantornis larvata, Rüpp.

Rüpp. Neu. Wirb. p. 91, t. xxxii. f. 1; Syst. Uebers. No. 260.—Heugl. Journ. f. Orn. 1867, p. 378.
P. flavoviridis, Rüpp. Syst. Uebers. p. 69, t. xxix.

Iris scarlet; beak black; legs greyish black.

Only met with about Dolo and Agula in Tigré, about half-way on the road between Adigrat and Antalo; at these places it abounded. Scarcely any birds had attained their full breeding plumage in the middle of May.

The eggs are stated by Von Heuglin to be pale bluish green, with a few violet-brownish spots at the blunter end.

Ploceus flavoviridis, Rüpp., is the same bird in winter plumage, when the bill is horn-coloured.

196. Hyphantornis melanotis (Guér.).

Ploceus melanotis, Guér. Rev. Zool. 1843, p. 321 (nec Lafresnaye).—Lefebvre, p. 110, Atlas, pl. ix.
P. Guérini, G. R. Gray, Gen. of Birds, ii. p. 351.—Ferr. et Gal. No. 110.—Heugl. Journ. f. Orn. 1867, p. 388.

Iris yellowish grey; beak black in the male, horn-coloured in both sexes in non-breeding plumage, and in the female always; legs flesh colour.

Common throughout the highlands, and seen at nearly 10,000 feet, though in general more common at a rather lower elevation. Specimens shot at Senafé at the end of May had assumed the full breeding plumage.

197. H. galbula (Rüpp.).

Ploceus galbulus, Rüpp. Neu. Wirb. p. 92, t. xxxii. f. 2; Syst. Uebers. No. 261.—Ferr. et Gal. No. 109.—Lefebvre, p. 109.—Brehm, Habesch, No. 87.—Heugl. Journ. f. Orn. 1867, p. 385.

Iris orange brown; bill black—in the male in breeding plumage only it is horn-coloured, the upper mandible being darker in the female, and in the male in non-breeding plumage; legs flesh-coloured.

Abundant on the shores of Annesley Bay, in the passes up to about 4,000 feet, and in the Anseba valley. In the latter locality it breeds in August; at the commencement of the month the nests were all built, but no eggs were laid. The nest is of grass, as usual shaped like a pear, with an opening at the side without any long tubular entrance, and is often hung on acacia trees.

198. H. luteola (Licht.).

Fringilla luteola, Licht. Verz. d. Doubl. p. 23, nota.
Ploceus personatus, Vieill. Gal. pl. lxxxiv. p. 117.
Hyphantornis chrysomelas, Heugl. Journ. f. Orn. 1862, p. 25.
Hyphantornis personata, Heugl. Journ. f. Orn. 1867, p. 390.
H. luteola, Finsch, Journ. f. Orn. 1868, p. 170.

Iris burnt sienna; bill black (in male only); legs horn colour.

Rare in the Anseba, and not seen elsewhere. It was breeding in the commencement of August. Mr. Jesse obtained the nest, which is, as usual, bottle-shaped, but with a long tubular entrance. It contained two white eggs.

199. Euplectes xanthomelas, Rüpp.

Rüpp. Neu. Wirb. p. 94; Syst. Uebers. No. 266, p. 67, t. xxviii.—Heugl. Journ. f. Orn. xv. 1867, p. 375.

This handsome species ranged to a greater height above the sea than any other Weaver-bird met with. It was common at 10,500 feet on the Wandaj pass and at Santara in Dalanta. I also found it at Ashangi at 8,000 feet, but never noticed it in any other locality. It had not quite assumed the full plumage at the beginning of May.

200. Quelea æthiopiça (Sund.).

Ploceus æthiopicus, Sundevall, Ofv. k. Vet. Akad. Forh. 1850, p. 126.
Euplectes quelea ou *sanguinirostris*, Ferr. et Gal. No. 112.
Q. sanguinirostris orientalis, Heugl. Journ. f. Orn. xv. 1867, p. 391.

Bill in male deep blood-red, paler towards the tip; orbit orange red; legs brown. In the female both bill and legs are much paler.

Only met with in Northern Abyssinia; it was first seen at Ailat, and occurred abundantly in the Anseba valley. It was several times seen feeding on insects, and even pursuing winged ants and catching them in the air. It was always in flocks, and did not appear to be breeding in the rains.

201. Coliuspasser laticauda (Licht.).

Fringilla laticauda, Licht. Verz. der Doubl. p. 24.
Coliuspasser torquatus, Rüpp. Neu. Wirb. p. 36.
Vidua laticauda, Heugl. Syst. Uebers. No. 273.—Journ. f. Orn. 1867, p. 395.

Only met with on two occasions on the highlands, once near Antalo, the other time near Agula, both in

May. It was in flocks in both instances, and very wary. It feeds on the ground.

A pair shot in the beginning of May measure :—

	Wing. in.	Tail. in.	Tarsus. in.	Bill from forehead. in.	Whole length about in.
Male	3·3	5·6	1·0	0·6	9·0
Female	3·2	4·3	1·0	0·55	7·6

All the specimens killed by me were in winter plumage, although they had assumed the long tail. The whole upper surface in both sexes is black, with pale brown margins to the feathers of the head, neck, and interscapularies—much less marked, however, on the last—and whitish on the rump. Wings and tail black, secondaries and outer rectrices with brown margins. Lower surface pale isabelline with black striæ, yellowish on chin and throat in some specimens. There is a distinct pale supercilium.

On closely examining the feathers, it is evident that a change of colour is taking place, on the head especially; here and there portions of the web are becoming reddish; and it is evident that in this bird the change from black and brown to red takes place without a moult.

I cannot help feeling surprised that so few naturalists admit *Coliuspasser* as a distinct genus from *Vidua*. Both have, it is true, lengthened tails; but there their resemblance ends. In *Vidua* only the central tail-feathers are elongated, and they are greatly changed in form; in *Coliuspasser* all are lengthened, and no modification takes place in form. *Vidua* has the bill of the *Estrildinæ*, *Coliuspasser* that of the *Ploceinæ*.

202. C. flavi-scapulatus, Rüpp.

Rüpp. Neu. Wirb. p. 98.
Vidua macrocerca, Heugl. Journ. f. Orn. 1867, p. 394.

I am indebted for the only specimen in my collection to Mr. Jesse, who shot it at Guna Guna. It is in winter dress. The upper part of the wing above being brilliant yellow, and the rectrices not produced in this dress, it has all the appearance of an *Euplectes.*

In this dress it may be distinguished from the southern *C. macrocerca,* Licht., by the tips of the quill feathers being dark. In *C. macrocerca* they are pale. This was pointed out to me by Dr. Finsch. In full plumage the two birds are very distinct, the interscapularies being yellow.

203. Vidua sphenura, Verr.

Bp. Consp. Gen. Av. i. p. 449.
V. paradisea, Rüpp. Syst. Uebers. No. 270.—Brehm, Habesch, No. 217.
V. sphenura, Heugl. Journ. f. Orn. 1867, p. 393.

Not rare at Komayli, at the base of the hills west of Zulla, in February and March, but not seen anywhere else; and it had apparently disappeared from the district in May. The male in full plumage is equal to *V. paradisea,* L., in size. The following are the dimensions of a fine male skin for which I am indebted to Captain Sturt. The length exceeds that given by Von Heuglin:—

	in.
Total length	15·75
Tail	12·5
Outer tail-feathers	2·3
Wing	3·2
Beak	6·4
Tarsus	0·7

211. Pytelia citerior, Strickl.

Strickland, Contributions to Ornith. 1852, p. 150.
Estrilda elegans, Rüpp. Syst. Uebers. No. 278.
Zonagastris citerior, Heugl. Journ. f. Orn. 1868, p. 19.

Iris sienna brown; beak light red; legs flesh colour.

Occasionally met with near the coast, and also in the Anseba valley up to 4,000 or 4,500 feet above the sea.

The bill in my specimen measures nearly half an inch. Von Heuglin gives 4¼ Paris lines.

212. Emberiza septemstriata, Rüpp.

Lefeb. p. 120.—Brehm, Habesch, No. 96.—Rüpp. Neu. Wirb. p. 86, t. xxx. f. 2; Syst. Uebers. No. 299.—Heugl. Journ. f. Orn. 1868, p. 77.

Iris dark brown; upper mandible dusky, lower yellowish; feet horn colour.

Abundant at places where water occurred near the coast, as at Saati, Ailat, &c. in Samhar, in July and August. Found also at Ain, and more rarely at higher levels. I shot one specimen at Senafé at the end of May.

Von Heuglin is probably correct in considering this Bunting as a permanent inhabitant. It very likely leaves the coast plain, however, in winter, like many other birds.

In Rüppell's description of this species the sexes are said to be similar, and the head is described as black above with a white streak in the centre. In the specimens collected by me the male alone has the head black above, and the central stripe above is grey, not white, the three side stripes, through the eye and above and below it, being white; the chin is white with a central

Anseba. The dimensions of my specimens slightly exceed those given by Von Heuglin:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
Female	1·9	1·85	0·5	0·36
„	1·9	1·75	0·5	0·34

208. **E. minima,** Vieill.

Vieillot, Ois. Chant. t. x.—Rüpp. Syst. Uebers. No. 276.—Heugl. Journ. f. Orn. 1868, p. 14.

Iris brown, orbit yellow; bill crimson, except a dusky line along the commissure, pink near the base; legs brown.

Not unfrequently met with on the highlands, and also in the Anseba valley.

209. **E. quartinia,** Bp.

Bp. Consp. Gen. Av. i. p. 461.
E. Ernesti II. Heugl. Journ. f. Orn. 1862, p. 29, et 1868, p. 10.

Iris crimson; legs dusky; upper mandible black, lower crimson.

Two specimens, both females, were obtained at Senafé. One of them measures: wing 1·8 in., tail 1·6, tarsus 0·6, bill from forehead 0·3 in.

210. **E. phœnicotis,** Swains.

Swainson, Birds of W. Afr. p. 192, pl. xiv.—Heugl. Journ. f. Orn. 1868, p. 18.
E. bengalus, Rüpp. Syst. Uebers. No. 275.

Common on the highlands, less so at a lower elevation, but seen not infrequently in the Anseba valley, and even as low as Ailat (1,200 feet above the sea) in Samhar.

211. Pytelia citerior, Strickl.

Strickland, Contributions to Ornith. 1852, p. 150.
Estrilda elegans, Rüpp. Syst. Uebers. No. 278.
Zonagastris citerior, Heugl. Journ. f. Orn. 1868, p. 19.

Iris sienna brown; beak light red; legs flesh colour.

Occasionally met with near the coast, and also in the Anseba valley up to 4,000 or 4,500 feet above the sea.

The bill in my specimen measures nearly half an inch. Von Heuglin gives 4¼ Paris lines.

212. Emberiza septemstriata, Rüpp.

Lefeb. p. 120.—Brehm, Habesch, No. 96.—Rüpp. Neu. Wirb. p. 86, t. xxx. f. 2; Syst. Uebers. No. 299.—Heugl. Journ. f. Orn. 1868, p. 77.

Iris dark brown; upper mandible dusky, lower yellowish; feet horn colour.

Abundant at places where water occurred near the coast, as at Saati, Ailat, &c. in Samhar, in July and August. Found also at Ain, and more rarely at higher levels. I shot one specimen at Senafé at the end of May.

Von Heuglin is probably correct in considering this Bunting as a permanent inhabitant. It very likely leaves the coast plain, however, in winter, like many other birds.

In Rüppell's description of this species the sexes are said to be similar, and the head is described as black above with a white streak in the centre. In the specimens collected by me the male alone has the head black above, and the central stripe above is grey, not white, the three side stripes, through the eye and above and below it, being white; the chin is white with a central black mark; throat cinereous, becoming blackish below. In the female the head-feathers are dusky brown with pale margins, the central stripe above being obsolete or rudimentary, and the lateral stripes isabelline; chin and throat pale brown with fine black marks. This is *E. capistrata*, Cab., to judge from the specimen in the Berlin Museum.

213. **E. flaviventris,** Vieill.

Vieillot, Encyc. Meth. 929.
E. flavigaster, Rüpp. Atlas, t. xxv; Syst. Uebers. No. 298.—Heugl. Journ. f. Orn. 1868, p. 75.

Bill brown; upper mandible dusky; legs brown.

Not a common bird in the Anseba valley, and met with also in Habab at about 3,000 feet above the sea. Captain Sturt shot specimens in a valley below Senafé. Dimensions:—

	Wing. in.	Tail. in.	Tarsus. in.	Bill. in.
Male	3·15	2·8	0·7	0·45
Female	3·1	2·6	0·7	0·4

214. **Passer Swainsoni,** Rüpp.

Emberiza capensis, Salt, No. 46, App. p. xlviii.
Pyrgita Swainsonii, Rüpp. Neu. Wirb. p. 94, t. xxxiii. f. 2.
P. simplex, Swains. Birds W. Afr. p. 208.
P. Swainsonii, Rüpp. Syst. Uebers. No. 295.

Iris brown.

The common Sparrow of the Abyssinian highlands, abundant about all villages: it is also common in woods, away from human habitation. It is rare at lower elevations, though I met with it once at Ailat.

In Rüppell's figure the white bars on the wing-coverts are omitted, and the ferruginous rump is neither shown in the drawing nor mentioned in the description. The dimensions also appear too small.

215. P. (*Gymnoris*) canicapillus (?), Blyth.

Blyth, Ibis, 1865, p. 46.

P. supra brunneus, capite cinereo, superciliis latis cinnamoneis postice in lateribus cervicis diffusis: rectricibus remigibusque fuliginosis, pallido-marginatis; genis, lateribus colli et pectore sordide canis, mento, gula abdomineque medio albescentibus macula gulari flavo haud conspicuo: iridibus olivaceis, pedibus rubello-corneis, mandibulâ fuscâ maxillâ palide corneâ.

	Long. tota. in.	Al. in.	Caud. in.	Tarsi. in.	Rostr. a fr. in.
1. Fœmina	5·0	3·1	2·0	0·65	0·45
2. "	4·75	3·15	1·9	0·65	0·5
3. Mas?	4·75	3·0	1·8	0·65	0·4

I found this bird solitary or in small flocks both in the woods and around villages in the Lebka valley and its neighbourhood, at 3,000 to 4,000 feet above the sea. It was especially abundant at the village of Rairo in Habab.

It is distinguished from *Xanthodina dentata,* Sundevall ("Ofvers. k. Vetensk. Acad." Stock. 1850, p. 127), and *Petronia albigularis,* Brehm ("Naumannia," 1856, p. 377), which Dr. Finsch considers to be the young of *X. dentata,* by having the eyebrow cinnamon instead of pale rufous, by the head being more grey, and by the back being browner and more uniform in coloration. Mr. Blyth considers that it is his *canicapillus,* and it only differs from the description in being a little smaller than *Passer* (*Gymnoris*) *flavicollis,* Frankl., while Blyth's type was of the same size. The specimen in the Liverpool Museum described by Blyth was probably from South Africa.

216. P. (*Gymnoris*) pyrgita (Heugl.).

Xanthodina pyrgita, Heugl. Journ. f. Orn. 1862, p. 30; ibid. 1868, p. 80.

Only killed once. A female was shot in the Komayli pass near Suru. It is a much larger bird than the last, with far more uniform colouring. Dimensions: wing 3·3 in., tail 2·5, tarsus 0·75, bill from forehead 0·45, whole length about 6 in.

217. Fringilla (*Polyospiza*) tristriata (Rüpp.).

Serinus tristriatus, Rüpp. Neu. Wirb. p. 97, t. xxxv. f. 2.—Lefebvre, p. 118.—Rüpp. Syst. Uebers. No. 289.
F. tristriate, Heugl. Journ. f. Orn. 1868, p. 91.

Iris brown, pupil small.

Very common throughout the highlands, generally amongst bushes, in small flocks or singly. It keeps much to the ground. I never saw it at lower elevations.

218. F. (*Poliospiza*) xanthopygia (Rüpp.).

Serinus xanthopygius, Rüpp. Neu. Wirb. p. 96, t. xxxv. f. 1; Syst. Uebers. No. 288.—Heugl. Journ. f. Orn. 1868, p. 90.

I only twice obtained specimens of this species, both on the highlands, one near Senafé, the other south of Antalo. Mr. Jesse shot it in the Anseba valley.

219. Crithagra striolata (Rüpp.).

Pyrrhula striolata, Rüpp. Neu. Wirb. p. 99, t. xxxxii. f. 1; Syst. Uebers. No. 317.
Serinus striolatus, Heugl. Journ. f. Orn. 1868, p. 94.

Iris brown.

This is not a very common bird, and it was only observed on the higher levels, usually solitary, but occasionally in flocks. I met with it above 9,000 feet.

220. Crithagra flavivertex, W. Blanford (Plate VII.).

C. supra olivacea, obsolete fusco-maculata fronte latâ aureâ, colore ad summo pileo paulatim olivascenti, superciliis flavis, postice productis, loris fuscis, colli lateribus olivaceis, immaculatis, uropygio flavo, remigibus cum tectricibus alarum rectricibusque fuscis, flavo-marginatis, remigium marginibus internis pallidis gastræo sordide flavo, olivascenti-lavato, crisso albescenti; rostro bruneo, pedibus fuscis.

Fœmina vix dilutius colorata.

Long. alæ maris* 3·15, *tarsi* 0·6, *rostr. a fronte* 0·35; *fœminæ, al.* 3·05, *caudæ* 2·25 : *long. tota circa* 5·25 *poll. Angl. et dec.

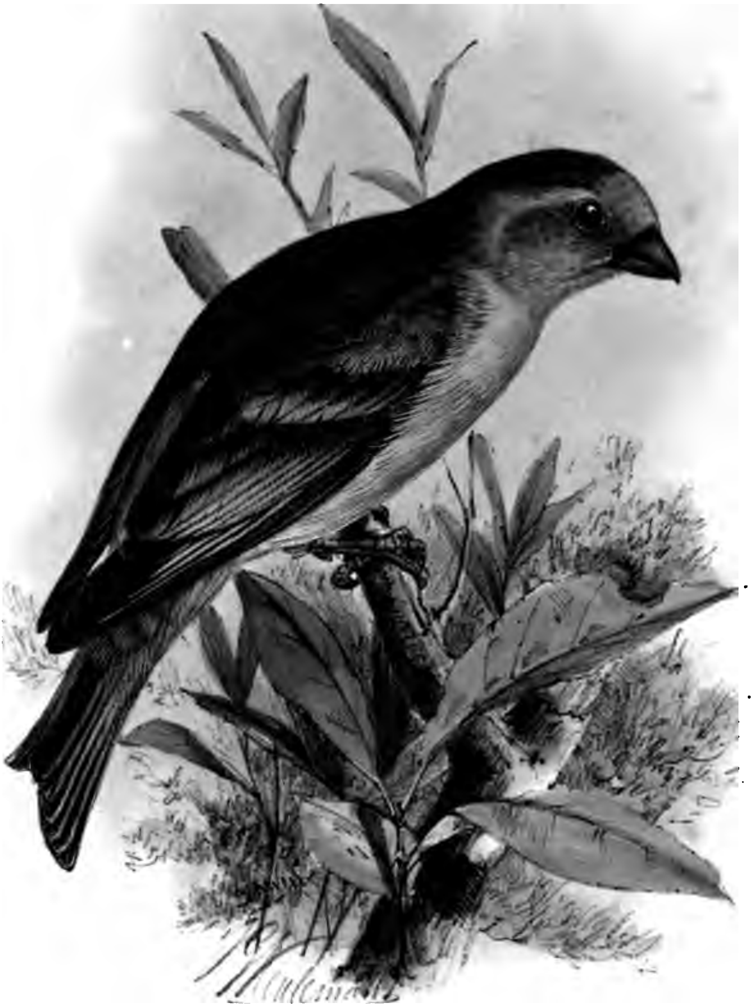
This bird is closely allied to *Crithagra butyracea*, L., and *C. canicollis*, Swains. It may be distinguished from the first by its yellow forehead being broader and by the colour passing gradually to olivaceous on the crown, whereas in *C. butyracea* the yellow is a narrow band sharply defined. There are several minor differences also. From *C. canicollis* it is distinguished by the back and sides of the neck being olive instead of bluish grey, and by both the forehead and underparts being brighter in colour. It is a much greener bird than *Serinus aurifrons*, Tristram, larger in size and with a less conical bill. *C. chloropsis*, Cab., from Mozambique is distinguished by having a much larger bill than the present species, larger wings, and less yellow coloration.

221. Serinus citrinelloides, Rüpp.

Rüpp. Neu. Wirb. p. 95, t. xxxiv. f. 1; Syst. Uebers. No. 286.
Fringilla citrinelloides, Heugl. Journ. f. Orn. 1868, p. 92.

Iris brown.

This bird agrees very poorly with Rüppell's description, but better with his figure, and still better with Von Heuglin's description. I shot a pair at Senafé on a large fig-



CRITHAGRA FLAVIVERTEX. W Blanf

tree. The dimensions are: wing 2·65 in., tail 1·9, tarsus 0·54, bill from forehead 0·37, whole length about 4·25 in.

222. S. nigriceps, Rüpp.

Rüpp. Neu. Wirb. p. 96, t. xxxiv. f. 2; Syst. Uebers. No. 287.—Lefebvre, p. 118.
Fringilla nigriceps, Heugl. Journ. f. Orn. 1868, p. 93.

Only seen at considerable elevations, but very common on the passes above 9,000 feet. It appears to belong to the Subalpine fauna, though a specimen was shot by my collector at Adigrat. It was always met with in flocks, keeping to open ground, and often seen on ploughed fields.

ORDER *GEMITORES.*

FAMILY COLUMBIDÆ.

223. Columba guinea, L.

Linnæus, Syst. Nat. ed. 12ª, p. 282.—Salt, No. 47, App. p. xlviii. —Rüpp. Syst. Uebers. No. 363.

Iris bronze yellow within near the pupil, copper colour externally.

This bird lives about rocks, also on Kolqual trees, around churches, and probably occasionally about houses. It is often seen in flocks in the fields. In the passes below Senafé it was not observed below 4,000 feet, but in the Lebka it occurred at only 2,000 feet above the sea.

I should scarcely call it a domestic Pigeon, as some writers do. It certainly is not nearly so constantly seen about villages as *C. intermedia* is in India, though it is often met with in the neighbourhood of houses.

224. C. albitorques, Rüpp.

Rüppell, Neu. Wirb. p. 63, t. xxii. f. 1.—Syst. Uebers. No. 364.

Iris dull red, approaching violet; beak black, cer white; legs pink.

This bird is somewhat intermediate in its characters between *Columba* and *Turtur*, but in its habits it i rather a Pigeon than a Dove, keeping in flocks, and usually on the ground. It is also excellent eating not bitter and tough like most Doves. It was onl seen on the highlands, in the temperate region.

225. Turtur semitorquatus (Rüpp.).

Columba semitorquata, Rüpp. Neu. Wirb. p. 66, pl. 23, fig. 2.
Turtur erythrophrys, Swains. Birds W. Afr. ii. p. 207, pl. 22.
Turtur semitorquatus, Rüpp. Syst. Uebers. No. 369.

Iris orange, orbit purplish; red legs; as also the bill black.

I first met with this large Dove about Lake Ashangi, and in the valleys further south about Lat and Dildi. It was not seen on the highlands of Tigré, but it occurred abundantly at Ain, on the Lebka, in Habab at a very low elevation, and in the Anseba valley. It always keeps to thick bushes and trees.

226. T. lugens (Rüpp.).

Columba lugens, Rüpp. Neu. Wirb. p. 64, t. xxii. f. 2.
Turtur lugens, Rüpp. Syst. Uebers. No. 368.

Iris orange yellow, with a tinge of orange; feet pink; bill reddish dusky.

The common Dove of the Abyssinian highlands. I did not notice it below 6,000 feet.

227. T. albiventris, G. R. Gray.

Gray, Genera of Birds, vol. ii. p. 472.
T. semitorquatus, Swains. Birds W. Afr. ii. p. 108.
T. risorius, Rüpp. Syst. Uebers. No. 366.

Iris crimson; beak dull slaty; legs purplish red.

The common Dove of the coast country, far more abundant, however, after the rains in February than before.

228. T. senegalensis, L.

Rüpp. Syst. Uebers. No. 367.

Iris dark brown.

This Dove ranges in altitude to a greater extent than the preceding species. It is most abundant in the subtropical belt, from 3,000 to 6,000 feet, but occurs both above and below these limits.

229. Peristera afra (L.).

Syst. Nat. ed. 12ª, i. p. 284.
P. chalcopsilos, Wagler, Systema Avium, No. 83.—Rüpp. Syst. Uebers. p. 98, t. xxxviii.

Iris brown; bill deep purple; legs purplish red.

A ground Dove, which keeps itself almost always amongst bushes and thick underwood. It was seen commonly in the thick jungles along the banks of ravines and watercourses in Samhar and Habab, especially about Ailat and Ain. Near Annesley Bay it was not met with, nor in the passes below Senafé, except about Mayen and Undul. On the highlands it was only observed in the western valleys, about Marawa and Dildi, south of Lake Ashangi. It is a shy, silent bird.

230. Æna capensis (L.).

Columba capensis, Linn. Syst. Nat. ed. 12, i. p. 288.
Æna capensis, Rüpp. Syst. Uebers. No. 371.

Iris brown; basal half of bill purplish red, tip yellow legs pink. In young birds the plumage is mottle the bill dusky, all of one colour, and the legs purplis brown. They were in this plumage, and evidently ful grown, in August.

I first met with this little Dove close to Dongol at about 6,500 feet above the sea, halfway betwee Adigrat and Antalo. It is, however, rare on the high lands. In December, January, and February, there wer none whatever near Annesley Bay, but after the rai in the latter month numbers appeared, and in May an June it was one of the commonest birds about Zull and Komayli. It also abounded in Samhar and th tropical portion of Habab, becoming, however, very rar or wanting in the subtropical or Anseba valley.

FAMILY TRERONIDÆ.

231. Treron abyssinica (Lath.).

Waalia, Bruce, Travels, vol. v. p. 186.
Columba abyssinica, Lath. Ind. Orn. Supp. p. lx.—Salt, No. 4 App. p. xlviii.
Vinago abyssinica, Rüpp. Syst. Uebers. No. 360.

Iris yellow or salmon colour, with a circle of pu blue round the pupil; bill dirty white; cere purplis pink: legs deep yellow.

This bird is very closely allied in its form and habi to the Indian Green Pigeon and its allies, and its call is a very similar liquid whistle, slightly differing in tone, and with the concluding portion a little harsher and more prolonged, but it was recognised immediately by all who were familiar with the peculiar note of the Indian bird. It feeds on fruit, especially those of different kinds of *Ficus.*

The Abyssinian Green Pigeon is chiefly found in the subtropical belt. I very rarely saw it on the highlands. In the passes below Senafé, it first appeared above Mayen or Undul Wells, at about 4,000 feet above the sea, and it was not seen above 6,000 feet. In the Lebka valley it made its appearance, as did many other birds, at a somewhat lower level, about 2,000 feet, and was common at 4,000 to 5,000 feet in the Upper Lebka valley, and on the Anseba. Like all its allies, it is delicious eating.

ORDER *RASORES.*

FAMILY PTEROCLIDÆ.

232. **Pterocles exustus,** Temm.

Temm. Pl. Col. 354.—Rüpp. Syst. Uebers. No. 384.

Occasionally seen near the coast, but not very common. Specimens killed were quite undistinguishable from Indian skins.

233. **Pt. Lichtensteini,** Temm.

Temm. Pl. Col. 355, 361.—Rüpp. Syst. Uebers. No. 357.

Iris brown; orbit lemon yellow; bill orange brown; feet orange yellow.

This bird has precisely the same habits as th closely allied *Pt. fasciatus* of India. It is rare if ever seen on open sandy plains; like *Pt. exustu* it keeps to bush and thin tree jungle, and is usuall found solitary, in pairs, or at the most two or thr pairs together. I once came upon a considerable flock in January, and possibly at that time these bird may collect in large numbers; but in May, June, July and August, it was rare to see more than four together except about watering-places. When disturbed the Sand Grouse rises with a sharp cackling cry, affording a ver difficult shot. It does not rise high, and usually settle again after a short flight.

All kinds of *Pterocles*, as is well known, fly t water at particular hours in the day, the hours varyin with different species. *Pt. exustus* drinks about 9 A.M and 4 P.M. In the present case the drinking-hou is at daybreak in the morning and at dusk in th evening, as is also the case with the Indian *Pt. fasciatus*, the crepuscular habits of which are mentioned by Jerdon ("Birds of India," vol. ii. p. 498), and hav been noticed by myself also. In the semi-desert country west and north-west of Massowa, in which *Pt. Lichtensteini* abounds, and there are but very few place where water is found, the scene at each spring of an evening, after a hot day especially, is very interesting At Saati, Ailat, and Ain there was a constant rush of thes birds from sunset till dark, and again in the morning before sunrise. Singly and in small flocks, uttering thei peculiar "queep-queep"-like note, they flew up and down the watercourse, on their way to or from the water, keeping only a few feet above the bushes and low trees; the noise of their wings being heard in the dusk before the birds themselves appeared. Like all other Sand Grouse, they are excellent eating, the flesh being rather hard, but of delicious flavour: and our party used generally to shoot a few each evening, not an easy matter, for the great swiftness and power of wing possessed by these birds rendered them, in the dusk especially, by no means an easy shot.

Pt. Lichtensteini appears entirely confined to the tropical coast region. At some water in the Lebka valley at Mohabar, only 2,000 feet above the sea, scarcely any came to drink in the evening, and at higher elevations none were met with.

234. Pt. gutturalis, A. Smith.

Smith, Zool. South Afr. Aves, pl. 3 and 31.—Rüpp. Syst. Uebers. No. 388.

Iris deep brown.—This fine species was only seen in two or three places on the highlands, and is probably local, as it is only mentioned in Rüppell's lists from Shoa, though Von Heuglin procured it near Adowa. I shot a pair near Agula, drinking at about 5 o'clock in the afternoon, and I also saw a few close to Antalo.

FAMILY NUMIDIDÆ.

235. Numida ptilorhyncha, Licht.

N. ptilorhyncha, Licht. *teste* Rüpp. Syst. Uebers. p. 102, t. xxxix.

Iris brown; wattles bright verdigris blue; casque and the bristles above the bill pale horny; legs reddish, dusky.

The Abyssinian Guinea-fowl is found througho the country, from the sea-coast itself to an altitude at least 9,000 feet. These birds keep much to cragg places, especially to rocky valleys, and often remain durin the middle of the day on the sides of the steep or prec pitous hills. They feed either in open fields or in woo amongst bushes, &c., in the morning and evening, an roost at night on high trees, a grove of lofty junipe being frequently selected for that purpose in the highland

Throughout the winter and spring, the Guinea-fowl remain in large flocks, usually of 200 or 300 birds eac These subdivide into smaller flocks to seek food durin the day, but keep to one general tract of country, an unite again at night. Where not pursued they are n particularly wary, and but little difficulty is found i getting within gunshot; but along the line of march the British army the Guinea-fowl soon became much mo watchful, and in places around Annesley Bay where first many were killed, it became almost impossible aft a time to get near the birds, even in cover.

In July and August the flocks divide into pairs, tw or three of which are often found together, and th breeding season commences. At this time the birds neve appear to collect into large flocks; I did not, howeve happen to see any of the roosting-places. I shot female with a fully-formed egg on the 9th of August. Th young are probably hatched about the end of Augu or beginning of September, as they are full-grown by th end of the year.

The voice is very similar to that of the common tam

Guinea-fowl. The food appears to consist to a larger extent of seeds and fruits than amongst the Partridges, insects being apparently but little sought after. In one instance three birds shot one morning near Halai had been feeding chiefly upon the small tubers or corms of the Quentee (*Cyperus esculentus*). Their crops also contained seeds and a few fragments of leaves, but amongst the three only one insect, a *Hemipter*. Their being so exclusively gramnivorous is probably the cause of the excellence of their flesh, which is far superior to that of most game birds. As may be imagined, they were much sought after by the sportsmen of the army, and during the stay of our small party in the Anseba valley we lived to no small extent upon these birds, as their flesh was as far superior to that of all other game except the Koodoo, as it was to that of the tough goats which we could obtain not without difficulty from the villagers.

FAMILY PERDICIDÆ.

236. **Francolinus Erkelii** (Rüpp.).

Perdix Erkelii, Rüpp. Neu. Wirb. p. 12, t. vi.
Frankolinus Erkelii, Rüpp. Syst. Uebers. No. 378.

Iris hair brown; beak black; legs yellow with much dusky on the toes; claws dusky.

This is perhaps the commonest Partridge of the Abyssinian highlands. It keeps much to rocky hill-sides, and has a considerable range in altitude, from about 3,000 feet above the sea to 10,000 feet. It abounded in the upper portion of the Senafé pass, and from the male being provided with two strong spurs, it was very generally known in the army as Spur-fowl, the name by which *Galloperdix spadiceus*, the male of which is also double-spurred, is generally known in India. The two forms are not by any means closely allied, but the name is far less objectionable than that of Pheasant applied by the Cape colonists to a species closely allied to *F. Erkelii*. In the Anseba at 4,500 feet *F. Erkelii* was only occasionally seen, but it inhabited the hills above the valley.

This Francolin is highly insectivorous, and the flesh, although generally excellent, has occasionally a rather strong taste, due doubtless to its food. Some which I killed about Undul in January had the crops filled with locusts. The grain dropped from the bags in the pass was a great attraction, and many might be seen late in the evening or early in the morning picking it from the road through the pass. Just below Senafé, I have seen fifteen or twenty of these birds in a walk of a mile. On being disturbed they usually ran up the hill, very rarely down, and never took flight, unless fired at or suddenly surprised. About dusk in the evening they roosted in trees, and the whole hill-side resounded with their cries "krī-krī-krī-krī-krī-kă-wă-wă-wă-wă," a harsh sound, the first syllables lengthened, the others quickly uttered.

I never saw *Francolinus Erkelii* in coveys; it was usually in pairs, or single. The difference in size between the sexes is very great, far more than is common amongst Partridges. The following are measurements in inches of a pair, taken in the flesh :—

	Length. in.	Wing. in.	Tail. in.	Tarsus. in.	Beak in front. in.
Male	19	8	5	2¾	1¼
Female	16	9	4½	2¼	1⅛

237. Fr. Rüppelli, G. R. Gray.

Gen. Birds, iii. p. 505.
Perdix Clappertoni, Rüpp, (nec Childr.) Atlas, t. ix.
Francolinus Rüppelli, Rüpp. Syst. Uebers. No. 379.

Iris brown; naked skin around the eye and legs deep red; the male with a double spur; bill black.

This bird, though found in the temperate region, and common in places about Antalo, rather belongs on the whole to a lower zone than *F. Erkelii* and *F. gutturalis.* I never met with it in the Senafé pass, nor in the province of Agamé about Senafé or Adigrat, nor in the higher valleys further south, whilst it was most abundant in the Upper Lebka and Anseba valleys at from 4,000 to 5,000 feet. The cry is harsh and monotonous.

238. Fr. gutturalis, Rüpp.

Rüppell, Syst. Uebers. p. 103, t. xl.

Iris brown; legs yellowish brown.

In December, January, and February these birds were met with in small coveys; subsequently they were seen in pairs, generally amongst bushes in valleys, and not keeping to rocky hill-sides like the last species. They were not seen in the pass, but were common around Senafé, and moderately so throughout the highlands. In the Anseba valley they were less abundant than the next species, but were more common in the valley itself than *F. Erkelii.* At this time in July and August the flesh was sometimes so rank as to be scarcely eatable, doubtless from their having fed largely on the *Coleoptera* which then abounded. In the winter months they were excellent.

The call is very similar to that of the common English Partridge, to which the plumage also presents some resemblance, so that sportsmen often take them for the same bird. In reality the present species rather resembles the common grey Partridge of India, *Francolinus (Ortygiornis) pondicerianus.*

239. Pternistes rubricollis (Rüpp.).

Perdix rubricollis, Rüpp. Atlas, t. xxx.
Pternistes rubricollis, Rupp. Syst. Uebers. No. 382.

Iris brown; legs reddish, dusky; beak dusky; gape reddish; naked skin around the eyes, with the lores, part of the ear, chin, and throat scarlet, passing downwards into yellow on the neck.

This is the Partridge of the coast, and was never seen above 3,000 feet. It was not observed above Komayli at the bottom of the pass leading to Senafé. In December and January it occurred in coveys of six to eight birds, subsequently single or in pairs. It chiefly keeps about bushy ravines, and is a great runner, not taking wing readily, but generally when disturbed endeavouring to run away. It has a peculiar harsh cry, uttered when disturbed; I did not notice its call. Like *Francolinus Erkelii*, it was generally known by the sportsmen of the army as Spur-fowl.

ORDER *GRALLATORES.*

FAMILY OTIDÆ.

240. Otis (*Eupodotis*) arabs, L.

Linnæus, Syst. Nat. ed. 12ª, i. p. 264.—Rüppell, Atlas, t. xvi; Syst. Uebers. No. 319.

Iris pale brown, with rather irregular dark streaks radiating from the pupil; bill dusky above, dirty white below; legs pale dirty yellow.

This fine Bustard is common on the plains near the coast, in open places, or in thin jungle, keeping a good deal to the former. The tracks were seen at an elevation of about 3,000 feet at Rairo in Habab, but as a rule it appears confined to the plains. Like most Bustards, it is rather wary, and is much easier to approach on horseback than on foot. I shot several from the saddle. The flesh is very good.

In the stomach I found locusts and a few *Coleoptera.* The male is much larger than the female, as usual in this sub-genus of Bustards.

241. O. (*Sypheotides*) melanogaster, Rüpp.

Otis melanogaster, Rüpp. Neu. Wirb. p. 16, t. vii. (mas.); Syst. Uebers. p. 107, t. xli.

Though this small Bustard was common on the tableland in places, especially on the open plains between Adigrat and Antalo, I never shot a specimen myself, and for the two obtained I am indebted to Lieut. St. John. Many were killed by officers along the line of march. They occurred in grass and bushes, generally lying close, and hiding as the Floriken of India does. Indeed this bird is a true Floriken in all its habits, and the plumage of the male undergoes a similar change to that of the two Indian species of *Sypheotides*, being grey in the winter and becoming in great measure black in the spring. Specimens shot in May had assumed the black plumage to a great extent. The flesh is delicious, quite equal to that of the Indian Floriken, which is one of the most delicately-flavoured game birds, and far superior to the large Bustards.

FAMILY CHARADRIDÆ.

242. **Œdicnemus crepitans,** Temm.

Rüpp. Syst. Uebers. No. 395.

Common near the coast. I cannot see any difference from European specimens.

243. **Æ. affinis,** Rüpp.

Rüpp. Mus. Senck. ii, p. 210; Syst. Uebers. p. 111, t. xlii.

I only saw this bird twice or three times, and I killed in August a single specimen in the Anseba valley, into which it appeared to be migrating, as I saw none before, but both I and Mr. Jesse saw it there more than once just before leaving. It appeared to have precisely the same habits as the common Stone Curlew.

The figure of this bird in Rüppell's "Systematische Uebersicht" is unsatisfactory. This is the only instance in the book, I believe, as most of the plates are admirable, and give an excellent representation of the birds figured.

244. Eudromias asiaticus (Pall.).

Apparently less abundant than the last on the coast. I shot some specimens inland at Rairo in Habab in August. They were in flocks, on open grassy ground.

245. Ægialitis Geoffroyi (Wagler).

Charadrius Geoffroyi, Wagl. Syst. Avium, Charadrius 19, 1827.
C. Leschenaultii, Lesson, Manual d'Orn. i. p. 322, 1828.
Hiaticula Geoffroyi, Rüpp. Syst. Uebers. No. 415.

Common on the sea-coast. I killed one specimen with a red breast in January.

246. Æ. niveifrons, Cuv.

This was abundant at Zulla in June, and apparently breeding, for the birds ran about with the usual tricks, pretending lameness and inability to fly. I also shot a specimen at Massowa in August.

247. Æ. tricollaris, Vieill.

Charadrius tricollaris, Vieillot, Nouv. Dict. d'Hist. Nat. xxvii. p. 147.
Hiaticula indica, Rüpp. Syst. Uebers. No. 412.

Iris grey, darker outside, orbit orange red; bill with basal half flesh-coloured, tip black; legs livid flesh-colour.—In flocks about freshwater springs at Ailat and Amba near Massowa, never seen on the sea-coast.

248. Chettusia melanoptera, Rüpp.

Iris yellow, greenish round the pupils; skin round the eye and legs purplish red.

In the characters of the wing and in the absence of the hind toe, this form belongs to the *Charadrius* group, while its voice, habits, and flight are unmistakeably those of a Lapwing. In voice and flight it resembles *Hoplopterus.* It is found usually in small flocks on grassy meadows throughout the highlands, ascending above 10,000 feet. I never met with it below about 7,000 feet; indeed the small meadows along the banks of streams in which it is generally seen are not common below the temperate region in Abyssinia.

249. **Sarciophorus tectus** (Bodd).

Charadrius pileatus, Gm. Syst. Nat. i. p. 691.
Sarciophorus pileatus, Rüpp. Syst. Uebers. No. 408.

Iris yellow, with a dusky circle round the pupil; bill and small wattle dull crimson; tip of bill dusky; legs purplish red.

This is a lowland form, chiefly confined to the coast country, but I met with it in the Anseba valley.

250. **Lobivanellus melanocephalus,** Rüpp.

Rüppell, Syst. Uebers. p. 115, t. xliv.

Iris grey, darker towards the pupil; skin round the eyes orange, paler externally; bill black; wattle and fleshy portion of base of upper mandible pale lemon yellow; legs yellow.

This species of Plover was only seen on the higher portion of the Dalanta and Wadela plateaux, above 10,000 feet elevation. Rüppell met with it on the mountains of Simen in April, when I saw it. It was in large flocks, which were very wary. It is a noisy bird, with a shrill call like "che-wip." The following measurements were taken in the flesh:—Length 13½ in., extent 30, closed wing 9¾, tail 4, tarsus 2⅜, middle toe 1⅝, beak from front 1$\frac{1}{16}$.

251. L. senegallus (L.).

Parra senegalla, L. Syst. Nat. ed. 12ᵃ, i. p. 259.
Lobivanellus senegalensis, Rüpp. Syst. Uebers. No. 406.

Iris grey, clouded towards the pupil; skin round eye yellow; wattle triangular, pointed below, stretching from the eye to the beak, the upper portion red, lower yellow, the two colours distinct, not blending; beak yellow, except the tip of the upper mandible, which is black; legs greenish yellow.

This Lapwing was only seen on the highlands near Agula below 7,000 feet, and in the Anseba valley, and was evidently scarce in both localities.

252. Hoplopterus spinosus (L.).

Rüpp. Syst. Uebers. No. 407.

Iris crimson; legs and bill black.

Only seen on the highlands on the banks of Lake Ashangi, but it also occurred at Ailat, and on the edges of a small stream at Amba near Massowa. Like the Indian species *H. ventralis*, it is probably mainly found on river banks, and never away from fresh water. The cry is precisely similar in both races.

253. Glareola pratincola, L.

G. limbata, Rüpp. Syst. Uebers. p. 113, t. xliii.

I obtained two specimens at Rairo in Habab, at about 1,000 feet above the sea, on a grassy plain far from any water. There is no question but that Rüppell's species was founded on a young bird. The Eastern form *G. orientalis*, distinguished by having the tail square and not forked, does not appear to be found so far west as the coasts of the Red Sea.

254. **Dromas ardeola, Paykull.**

Paykull, Hand. k. Vetenk. Acad. Stockholm, 1805, p. 108, t. viii.
Id. Rüpp. Syst. Uebers. No. 439.*
Erodia amphilensis, Salt, App. p. lxi. and plate.

Not rare on the coast, usually in small flocks.

Family SCOLOPACIDÆ.

255. **Numenius arquatus, L.**

Rüpp. Syst. Uebers. No. 452.

Common on the shore in winter.

256. **N. phæopus, L.**

Rüpp. Syst. Uebers. No. 453.

A single specimen obtained at Massowa on August 25.

257. **Scolopax gallinago, L.**

Rüpp. Syst. Uebers. No. 470.

Common on the highlands in the winter months. There were many in marshy spots on the shores of Lake Ashangi; as late as the beginning of May, eight to ten couple were shot by a single officer on two afternoons, in about a couple of hours' time.

258. **Rhynchæa bengalensis (L.).**

Rüpp. Syst. Uebers. No. 469.

The Painted Snipe was only met with in reeds on the banks of running water at Ailat and Ain, near

Massowa. Only two or three birds were seen at each place. The specimens are quite undistinguishable from Indian ones.

259. **Terekia cinerea** (Gm.).

A single specimen shot at Zulla in January.

260. **Actitis hypoleucos** (L.).

Totanus hypoleucos, Rüpp. Syst. Uebers. No. 458.

Common near inland streams. I only collected specimens on the Anseba.

261. **A. ochropus** (L.).

Rüpp. Syst. Uebers. No. 460.

Common on the highlands. I did not note its occurrence on the coast.

262. **Totanus calidris**, Bechst.

Scolopax calidris, Salt, No. 52, App. p. xlviii.
T. calidris, Rüpp. Syst. Uebers. No. 459.

A single specimen obtained on the coast in January.

263. **Tringa cinclus**, L.

Obtained at the same place and about the same time as the last.

264. **T. minuta**, Bechstein.

Also shot at Zulla.

FAMILY RALLIDÆ.

265. **Rallus Rougeti**, Guér.

Guérin, Rev. Zool. 1844, p. 322.—Ferr. et Gal. iii. p. 253.
R. abyssinicus, Rüpp. Syst. Uebers. p. 127, t. xlvi.

Iris dull red; beak also dull red; legs reddish brown. Common amongst reeds and bushes in swamps, and on the banks of streams in the highlands. It has the usual habits of the genus, being a skulking shy bird, not easy to shoot, from its always hiding in the thickest bush or tuft of grass, and from its unwillingness to take flight. It has a very loud harsh croaking call, repeated several times in succession. On the borders of Lake Ashangi, in some swamps with rushes about three feet high, there were many of these Rails. In the day-time they were invisible; one might walk about the marshes for hours without suspecting their presence; but about sunset they used to sit on the tops of the rushes and call. At a shot all vanished amongst the reeds, but they soon reappeared. By noticing this habit I obtained several specimens.

266. **Gallinula chloropus**, L.

Rüpp. Syst. Uebers. No. 479.

The common Moor-hen was pretty common around Lake Ashangi, and I occasionally saw it elsewhere.

267. **Fulica cristata**, L.

Iris dull red; legs olive-grey; beak and forehead flesh-coloured; the two fleshy knobs on the occiput dull red, and much larger in the male than in the female.

The Crested Coot precisely resembles the Common Coot in its habits, and abounds on Lake Ashangi.

FAMILY ARDEIDÆ.

268. **Ardea atricollis**, Wagl.

Wagl. Syst. Av. Ardea, sp. 4.
Smith, Ill. S. Afr. Zool. Aves, pl. 86.—Heugl. Syst. Uebers. No. 599.

Iris bronze yellow; upper mandible dusky, lower pale; legs dusky; soles of feet yellowish.

I only once obtained a specimen of this Heron. It was killed in a swampy meadow near Adabagi, two marches south of Adigrat, at an altitude of about 8,000 feet above the sea.

269. **Herodius garzetta,** L. var.

Rüpp. Syst. Uebers. No. 427.

Common on the coast. I also saw an Egret on the highlands, probably the same, but I failed to secure a specimen.

270. **Ardea** (*Demi-egretta*) **gularis,** Bosk.

Act. Soc. d'Hist. Nat. i. p. 4, pl. ii.
A. schistacea, Hemp. and Ehr., Symb. Phys. t. vi.
A. asha, Sykes, P. Z. S. 1832, p. 157.
Egretta gularis, Rüpp. Syst. Uebers. No. 428*.

Iris yellowish white; bill reddish yellow; legs black; feet yellow.

I obtained a single specimen at Dissee Island. As shown by Mr. Blyth (Journ. As. Soc. Bengal, 1855), there can be no question of the identity of this species with the Indian form. I have compared my specimen carefully with those in the Calcutta Museum.

271. **Ardea** (*Ardeola*) **comata,** Pall.

Pallas, Reise, ii. p. 715.
A. ralloides, Rüpp. Syst. Uebers. No. 432.

I obtained a specimen at Antalo. This bird was only occasionally seen on the banks of freshwater streams.

272. **Ardea** (*Butorides*) **atricapilla,** Afzel.

Afzel. Of Stockh. 1804.

I shot a specimen in winter plumage in February, and another in the breeding livery in August, both on the sea-shore amongst mangrove.

FAMILY CICONIDÆ.

273. **Scopus umbretta**, Gm.

Rüpp. Syst. Uebers. No. 435.

This peculiar bird was not common in general on the highlands, although a few were seen about Lake Ashang and elsewhere. It was abundant on the Anseba, after the rains had fairly set in.

274. **Ciconia abdimii** (Hemp. and Ehr.).

Sphenorhynchus abdimii, Hemp. and Ehr., Symb. Phys. t. v.
Ciconia abdimii, Rüpp. Atlas, t. viii.; Syst. Uebers. No. 443.

Iris dusky grey; beak dusky green, reddish at the gape towards the tip; naked skin of the sides of the head lavender, deep red in front of the eye and under the chin, white round the back of the orbit; ears red; the skin beneath the feathers red throughout; feet dull red; legs olivaceous.

Occasionally seen on the highlands, but not common. About the shores of Annesley Bay it is much more frequent, and I several times saw it in the Anseba valley. It is by no means a shy bird in general, but sometimes difficult to approach when on open plains. I once saw five by some carcases of mules at Komayli, doubtless attracted by the insects.

FAMILY TANTALIDÆ.

275. **Ibis** (*Geronticus*) **comata**, Ehr.

Geronticus comatus, Ehr. apud Rüpp. Syst. Uebers. p. 199, t. xlv.

I only met with this bird on the highlands, once near Senafé, and again in a large flock near Antalo. On the second occasion I secured two specimens. It appears to be by no means common in the region traversed.

276. **I. (*Harpiprion*) carunculata,** Rüpp.

Rüpp. Neu. Wirb. p. 49, t. xix.; Syst. Uebers. No. 448.

Iris pearly white, with a broad brown ring round the pupil.

This is a far more common bird than the last, abounding throughout the higher portions of the highlands. It was common around Senafé, at Ashangi in the meadows and swamps around the lake, and above all on the Wadela and Dalanta plateaux. It is seen solitary or in small flocks, usually keeping to open meadows or cultivated fields, and feeding upon snails, caterpillars, beetles, locusts, &c. It has a harsh cry, seldom uttered.

ORDER *NATATORES.*

FAMILY ANATIDÆ.

277. **Anas flavirostris,** Smith.

Bill yellow; nail at end, a stripe between the nostrils, and all the basal part of the lower mandible black; legs blackish brown.

Common throughout the highlands, and especially on the higher plateaux, in all streams.

Measurements in the flesh: length 21 in., closed wing 10½, tail 3½, bill from front 1⅞ in.

278. **Fuligula cristata,** Ray.

Lake Ashangi, in pairs, and not very common at the commencement of May.

279. Querquedula crecca, L.

Occasionally met with on the highlands. I did not see *Q. circia.*

280. Chenalopex ægyptiaca, L.

Rüpp. Syst. Uebers. No. 487.

Iris orange yellow; bill flesh colour above and below; tips and edges of both mandibles and base of the upper one dusky, but the dark colour is unequally distributed in different specimens, and is sometimes wanting; legs pink, with pale mottling.

A common bird throughout the highlands. It is in general excellent eating, and was consequently much sought after by the sportsmen of the army; and a large plain, about four miles south of Senafé, on which the 3d Bombay Cavalry were for some time encamped, was known as "Goose Plain," from the numbers of these birds found upon it. It keeps chiefly to open grassy plains near streams, during the winter and spring months at least, and, like most Shieldrakes, appears to keep much in pairs at all seasons of the year, these pairs occasionally collecting into considerable societies, which however have by no means the same united volition which may be seen in birds habitually found in flocks, like most Ducks and Geese. On the shores of Lake Ashangi the Egyptian Goose abounded, and hundreds might be seen scattered over the grassy plains around the lake; but they came to the feeding-grounds singly or in pairs, rarely in larger numbers, and flew away in the same manner.

About the middle of July several of these birds made their appearance in pairs along the banks of the Anseba, then a muddy torrent, and commenced building on the trees overhanging the stream. Mr. Jesse killed one hen bird at the end of July, containing a fully-developed egg.

In most of its habits this bird closely resembles the common Chakwa of India, *Casarca rutilans*, but it is more frequently seen on meadows. Both its flight and call are those of a Shieldrake rather than of a Goose.

The brown chest-spot varies much in dimensions, and is sometimes wanting. It is usually larger in the males than in the females.

281. Bernicla cyanoptera, Rüpp.

Rüppell, Syst. Uebers. p. 129, t. xlvii.

This dwarf Goose abounds on the Wadela and Dalanta plateaux, above 9,000 to 10,000 feet, and is a conspicuous member of the Subalpine fauna to which reference has so frequently been made. I only saw the bird once elsewhere ; this was in a high valley at about 8,500 feet above the sea, between Antalo and Ashangi. The habits of the bird are rather those of a Shieldrake than of a Goose, for it is not met with in flocks (at least that is not the case in April, the season when I saw it), but singly or in pairs, walking about on open grass plains near streams and swamps.

Family PODICIPIDÆ.

282. Podiceps cristatus, L.

Heugl. Syst. Uebers. No. 706.

Iris Indian red; beak dusky reddish brown; legs and feet dusky olive; dirty yellow on the webs, and on the upper part of the tarsus.

The Crested Grebe is extremely abundant on Lake Ashangi, where it is doubtless a permanent resident.

283. P. auritus, L.

Heugl. Syst. Uebers. No. 708.

Not very common on Lake Ashangi. It is curious that the people in the neighbourhood persist in declaring that there are no fish in this lake, yet it abounds in fish-eating birds. I saw shoals of small fish, but had no means of catching them; and I have little doubt that larger kinds also occur, for I found tracks of Otters along the shore, and several were seen by a friend.

284. P. minor, Lath.

Rüpp. Syst. Uebers. No. 502.

Not abundant on Lake Ashangi. I also saw it once on a pool; and one species, perhaps the same, occurred on the coast at Zulla.

Family LARIDÆ.

285. Larus fuscus, L.

Common at Zulla. The wing is a little longer, about an inch, and the bill a trifle smaller, than in most European specimens, but there appears to be no constant distinction.

286. L. Hemprichii, Bonap.

Perhaps the commonest species in Annesley Bay. It also abounds in Aden harbour.

287. L. leucophthalmus, Licht.

Temm. Pl. Col. 366.
Xema leucophthalmum, Rüpp. Syst. Uebers. No. 507.

Common in Annesley Bay.

288. Sterna (*Thalasseus*) affinis, Rüpp.

Rüppell, Atlas, t. xiv. 1826; Syst. Uebers. No. 518.
S. bengalensis, Lesson, Traité d'Ornith. p. 621 (1831).

Abundant on the sea-coast near Zulla. Frequently seen in large flocks.

289. Sterna (*Onychoprion*) panayensis, Gm.

Iris dark brown; bill and legs black.

I did not meet with this species in Annesley Bay, but it abounded farther south in the Red Sea, and I captured several specimens, which alighted on the boat during my voyage from Massowa to Aden.

FAMILY PHAETONIDÆ.

290. Phaeton rubricauda, Bodd.

A single specimen of a young bird was captured alive in Annesley Bay, and sent to me by Captain Mockler. I did not notice any flying about the bay. The Tropic Birds usually keep out at sea.

FAMILY GRACULIDÆ.

291. Graculus africanus, Gm.

Iris crimson; bill flesh colour, dusky on culmen; feet black.

I only saw Cormorants on Lake Ashangi, and onl this species. It is not very abundant.

FAMILY PELICANIDÆ.

292. Pelicanus rufescens, Lath.

Rüpp. Atlas, t. ii.

Iris yellowish brown, mottled darker; bill yellowis white; nail at tip of upper mandible orange; pouch fles colour, with fine transverse equidistant and parall yellow lines; legs yellowish white.

I shot a pair of these birds on Dissi Island, at the en of August. They were in fine plumage, with a ric roseate tinge on the back.

293. P. phillipensis, Gm.

Iris grey brown; bill flesh colour; nail at end of uppe mandible yellow; gular pouch livid; legs and feet pal flesh colour.

Between this bird—which was common on the shor at Zulla, and of which I shot a single specimen—an the last there is no difference in measurements, i the form of the frontal feathers, or the disposition o those behind the eye. The crest also appears similar and although the feathers of the head are shorter an more woolly, this may partly be due to wear. Unde these circumstances, I should have been inclined to con sider the roseate back and breast of *P. rufescens* a seasonal, but for the circumstance that while the presen specimen is unquestionably identical with the commo

Indian *P. phillipensis*, with specimens of which I have compared it, *P. rufescens* does not appear to have been noticed in India. If it were only the nuptial plumage of the present species, it ought to be equally common.

CLASS REPTILIA.[1]

ORDER *CHELONIA.*

1. **Cinixys belliana,** Gray.

> *Kinixys belliana,* Gray, Synopsis Rept. Add. and Corr. p.
> Catalogue of Shield Rept. in Coll. Brit. Mus. 1855, p. 13,
> *Cinixys belliana,* Dum. et Bibr. Erp. Gen. ii. p. 168.
> *Kinixys Shæensis,* Rüpp. Mus. Senck. iii. p. 223.

Five specimens were obtained in the Anseba valley between 4,000 and 5,000 feet above the sea. This l Tortoise chiefly inhabits the thickets on the banks of river, and under bushes in the neighbourhood. I ne saw it on open ground.

2. **Pelomedusa gehafie,** Rüpp.

> Gray, Cat. Tort. Croc. &c. Brit. Mus. p. 38.; Cat. Shield R
> p. 53.
> *Pentonyx gehafie,* Rüpp. Neu. Wirb. p. 2. t. i.
> *Pelomedusa gehafiæ,* Gray, Cat. Tort. Croc. &c. Brit. Mus. p.
> Cat. Shield Rept. p. 53.

Not uncommon in the Anseba and its feeders. I a found it in the Lebka. During the dry season th rivers completely disappear, and this Tortoise must bu itself. It has a most offensive smell.

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[1] For the determinations of the majority of the reptiles, I am indebte the kindness of Dr. Günther.

The name *gehafie* is taken from the Tigréan language. To alter it into *gehafiæ*, as Gray has done, is of course a mistake.

ORDER *SAURIA.*

3. Chamælio lævigatus (?), Gray.

Gray, Proc. Zool. Soc. 1863, p. 95.

I obtained a single young specimen in the Anseba valley. I am far from certain that it belongs to the above-named species, as, despite its not being adult, the crest is more strongly developed than in the full-grown specimen in the British Museum. The colouring is the usual greenish grey, varying according to circumstances, with two rows of subquadrate white spots along the sides.

4. Varanus ocellatus, Rüpp.

Rüpp. Atlas, t. vi.
Dum. et Bibr. Erp. Gen. iii. p. 496.
Regenia ocellata, Gray, Cat. Lizards, Brit. Mus. p. 9.

One specimen procured in the Anseba valley; it was under a rock in rather open ground. The spots are scarcely perceptible, and the head is longer and not rounded above, as in Rüppell's figure, but there is no essential difference. The measurements are the following:—

	ft.	in.
Whole length from nose to end of tail	2	7·0
Length of tail from anus	1	2·0
" of head, about	0	3·0
" from ear to point of nose	0	2·75
" of foreleg from shoulder to end of middle toe	0	4·75
" of middle toe of same and claw	0	1·25
" of hindleg to end of second toe	0	6·0
" of longest toe (second) and claw	0	1·3

5. **Agama** (*Stellio*) **cyanogaster,** Rüpp.

Rüpp. Neu. Wirb. Rept. p. 10, t. v.—Dum. et Bibr. iv. p. 532.

Extremely abundant throughout the highlands, where may often be seen upon rocks. It is especially commc in Northern Tigré on sandstone. It is a large, brightl coloured, and handsome lizard, and very active and war so much so that I could only obtain specimens by shoo ing them. I never saw it in the Anseba valley, nor i general below 7,000 feet of elevation.

The blue veining of the under-parts is far more coı spicuous in some specimens than in others; usually it to a great extent confined to the chin. The followir are the dimensions of a moderate-sized specimen:—

	in.
Whole length	10
Length of head	1·25
„ of tail from anus	5·7
„ from ear to end of nose	1·0
„ of foreleg with toe	2·3
„ of fourth toe of forefoot	0·6
„ of hindleg to end of longest toe	3·0
„ of fourth toe of hindfoot	0·6

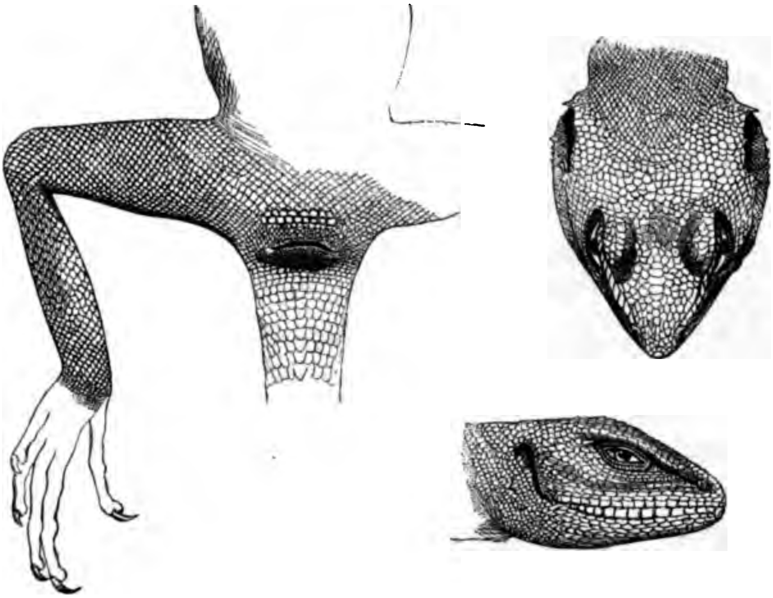
6. **Agama annectans,** sp. nov.

A. rufo-fusca, nigro-marmorata, squamis omnibus parvis, fere æqualib capite depresso subtriangulari, regionibus paroticis et interscapulio sparsi spinosis, dorso non cristato, cauda elongata, attenuata, squamis caudalib antice distincte annulatis, postice subimbricatis.

	1	2
Long. tota	12·0	—
„ *capitis*	1·3	1·5
„ *corporis*	3·2	4·0
„ *caudæ ab ano*	7·5	—
„ *pedis anterioris cum digitis* . . .	2·8	3·0
„ *ejusdem dig. primi cum ungui* . .	0·4	0·4
„ „ *secundi* „ . .	0·47	0·5
„ „ *tertii* „ . .	0·6	0·6

	1	2
Long. ejusdem dig, quarti cum ungui . .	0·6	0·65
„ „ *quinti* „ . .	0·52	0·55
„ *pedis posterioris cum dig.*	3·5	3·9
„ *ejusdem dig. primi cum ungui* . .	0·35	0·4
„ „ *secundi* „ . . .	0·55	0·6
„ „ *tertii* „ . . .	0·75	0·8
„ „ *quarti* „ . . .	0·8	0·87
„ „ *quinti* „ . . .	0·7	0·75

Hab. haud procul a littore maris Erythræi in montibus Habessinicis ad elev. circa* 2,000 *ped.



Rufous brown (in spirit) with irregular blackish rings, and an indistinct whitish line down the centre of the back. Scales small throughout, and subequal. Head subtriangular, flat, the length twice the height at the eyes, and exceeding the breadth in the proportion of 4 to 3. Nose rather blunt, terminated by a single punctulated rostral scale, much more broad than high; n trils towards the hinder part of a swollen subovate sca separated by one or two scales from the rostral. *Canth rostralis* and supra-orbital ridge prominent, terminati at the nasal scale. Frenal region depressed, covered wi small elongate scales. Forepart of the head covered wi nearly flat scales, those in the centre a little longer th the others; occiput covered with flat scales towards t forehead, whilst behind and towards the temporal regio they are slightly keeled. Ear-opening large, nearly equ to the eye. A few spines scattered around it, especial behind eyelid, covered with small scales. Mental shie almost oval, a little broader than high. Supra-labials abo 14, not extending to the gape, the row of larger scal constituting them being, however, continued backward and terminating in a small spine above the gape. Infr labials 12—13, also not extending back quite as far a the gape. Chin covered with small rhomboidal scale decreasing in size backwards. Throat with two or thre irregular cross folds. Back not crested, covered wit small imbricate scales, those near the centre larger an slightly keeled, especially towards the front. A fe scattered spines of small size between the shoulders Tail longer than the head and body; scales a littl larger than elsewhere, strongly keeled, disposed in narro rings in front, but becoming gradually imbricate toward the tip. Scales of the belly small, smooth, rhombic, subequal. Pre-anal pores eight in a single row. Third and fourth toes in the fore foot subequal; in the hind foot th third toe is very little shorter than the fourth. Point o longest hind toe reaching the eye when the hind leg is laid along the side. Fore toe just extending back to the thigh.

I obtained two specimens of this apparently new *Agama* near the base of the pass leading from Komayli to the highlands. In one the tail is imperfect. The species forms an unmistakeable link between *Agama* and *Stellio*, for although the structure of the tail scales is that of the latter, they being arranged in distinct rings, the animal otherwise agrees best with the former.

7. **Agama colonorum**, Daud.

Lacerta agama, L. Syst. Nat. ed. 12, vol. i. p. 367.
A. colonorum, Daudin, Hist. Rep. iii. p. 356.—Dum. et Bibr. iv. p. 489.—Rüpp. Neu. Wirb. p. 14, t. iv.

This Lizard was common on granite rocks about Rairo near Af Abed, north of the Lebka, at about 3,000 feet above the sea. The head in many specimens was bright blue in colour, chin scarlet. Doubtless these colours are seasonal as in *Calotes*.

8. **A. occipitalis**, Gray.

Gray, Phil. Mag. 1827, p. 264.
A. colonorum, var. Dum. et Bibr. Erp. Gen. iv. p. 490.

A single specimen taken at Antalo on the highlands with *Stellio cyanogaster*.

9. **Lacerta samharica**, sp. nov.

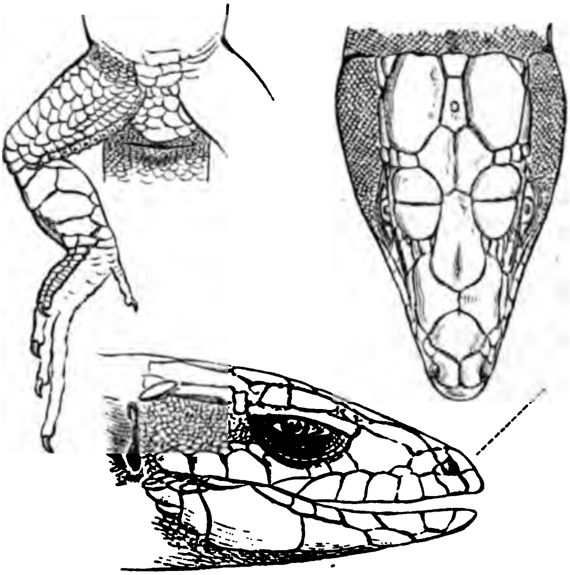
Dum. et Bibr. v. p. 278.

L. grisea, superne longitudinaliter fusco-fasciata et maculato-strigata, squamis dorsalibus antice rotundatis convexis, postice carinatis, ventralibus 6-seriatis, rhombeis, preanali una majori; squamis postoccipitalibus magnis a minoribus polygonis circumdatis, naribus in angulo posteriori et inferiori squamæ inflatæ nasalis positis, et a squama nasali duobus post nasalibus et *prima supralabiali circumdatis; cauda duplo quam corpore cum ca longiori, pede posteriori ad humerum attingente.*

	1	2
Long. tota	12·75	12·25
„ *capitis*	0·95	0·85
Lat. ejusdem	0·52	0·45
Long. corporis	3·4	2·95
„ *caudæ ab ano*	8·75	9·0
„ *pedis anterioris cum digitis*	1·25	1·1
„ *ejusdem digiti primi cum ungui*	0·2	0·18
„ „ *secundi* „	0·35	0·25
„ „ *tertii et quarti* „	0·4	0·35
„ „ *quinti* „	0·3	0·24
„ *pedis posterioris cum digitis*	2·3	2·15
„ *ejusdem digitis primi cum ungui*	0·22	0·22
„ „ *secundi* „	0·35	0·35
„ „ *tertii* „	0·5	0·46
„ „ *quarti* „	0·8	0·75
„ „ *quinti* „	0·4	0·35

Colour grey, with varying dusky lines and rows spots along the back. Head not quite twice as long it is broad, bluntly conoidal; nostrils in the lower hind angle of the nasal shield just above the first upp labial, with two post-nasals, the upper of which, howeve scarcely reaches the nostril. Two loreal scales, one befo the other, the posterior largest. A large post-occipit shield on each side surrounded by smaller polygon shields; between the two is an elongated pentagon shield, with a small ring-shaped depression in the cent one shield behind it and two in front. Two supra-orbit shields on each side, separated from the supra-orbit ridge of small shields by a row of small granular scal Lower eyelid covered with small granular scales. Upp labials about 10, the seventh from the rostral expand above, and forming the lower portion of the orb

Lower labials about 7. Collar distinct of about eight enlarged scales. Ventral shields rhombic in six rows, a row of smaller semicircular shields along each side of them. Scales of the back rounded in front, becoming rather larger and keeled behind, those of the tail strongly keeled, arranged in distinct rings. Pre-anal shield of moderate size, with about three rows of smaller shields between it and the thighs. About 10 to 11 femoral pores on each thigh. Hind-foot laid forward reaching to the shoulder, fore-foot laid back reaching about half-way to the thigh. Tail compressed, about twice as long as the head and body.



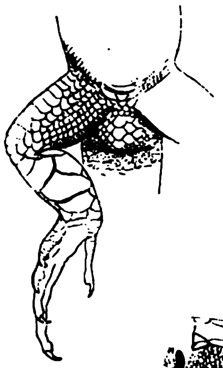
This Lizard was common near the coast. I unfortunately only brought two specimens away, however.

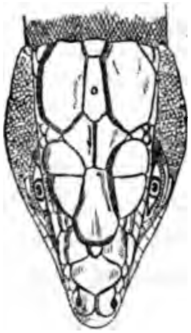
10. L. Sturti, sp. nov.

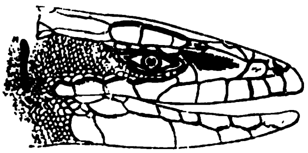
L. peraffinis præcedenti, sed cauda longiori magis rotundata, dig brevioribus, squama pre-anali majori nulla, digitus quartus pedis posteri aurem attingit.

	Poll. Angl.
Long. tota	13·0
„ *capitis*	0·75
Lat. ejusdem	0·45
Long. corporis	2·45
„ *caudæ ab ano*	9·8
„ *pedis anterioris c. digitis*	1·1
„ *ejusdem digiti primi c. ungui*	0·15
„ „ *secundi* „	0·3
„ „ *tertii et quarti c. ungui*	0·35
„ „ *quinti* „	0·22
„ *pedis posterioris*	1·85
„ *ejusdem digiti primi c. ung.*	0·22
„ „ *secundi* „	0·32
„ „ *tertii* „	0·43
„ „ *quarti* „	0·67
„ „ *quinti* „	0·4

But for the difference in the pre-anal shields I shou not describe this specimen as a separate species from t last, the other distinctions being very trifling. The he is a little shorter and blunter, but the shields are ve similar, there being a very small additional shield b tween the two post-frontals. Supra-labials 9, the six from the rostral expanded above; infra-labials 6. Shiel of the collar about 14, but they pass so completely in the smaller scales at each end that it is difficult assign a precise number. Ventral shields in six rows, w a row of smaller flat shields at each side of the Scales of back granular, passing gradually behind in the strongly-keeled scales of the tail. Toes compress not keeled beneath. Hind-toe reaching forward to the ear, fore-toe extending back more than two-thirds of the distance to the thigh. Femoral pores 12 in each thigh. Pre-anal shields all smaller than the ventral.







A single specimen was obtained by Captain Sturt, to whom I am indebted for it, and after whom I have named it, in the Komayli pass, near Undul Wells.

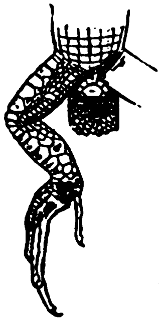
II. Acanthodactylus mucronatus, sp. nov.

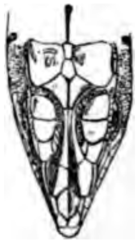
A. griseo-fulva, fasciâ medianâ fuscâ dorsali, strigisque lateralibus ex griseo et fusco compositis ornata, pedibus supra fuscis, griseo-maculatis; nari in medio 4 squamarum positâ duarum anteriorum, duarum posteriorum, squamis supra-orbitalibus utrinque duobus, granulis supra infra et postice sed non antice circumdatis, verticali. Elongato-pentagonali, in medio sulcatâ, post-occipitalibus magnis, polygonis squamis parvis 4 valde inæqualibus

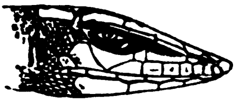
intervenientibus. Pedis posterioris digitus fere ad rostrum attingit. Sq ***pre-analis magna, minoribus circumdata.***

Long. tota	6.5
„ *capitis*	0·52
Lat. ejusdem	0·3
Long. corporis	1·45
„ *caudæ ab ano*	4·6
„ *pedis anterioris*	0·75
„ *ejusdem digiti tertii (et quarti) c. ungui*	0·25
„ *pedis posterioris*	1·55
„ *ejusdem digiti primi c. ungui*	0·22
„ „ *secundi* „	0·25
„ „ *tertii* „	0·35
„ „ *quarti* „	0·53
„ „ *quinti* „	0·35

Greyish tawny in colour, with a dark band along centre of the back, and others of dusky mixed w







grey at the sides. Legs dusky above, spotted p Snout very pointed, somewhat alternate; nostrils in centre of four small shields, two anterior and two p terior, a distinct *canthus rostralis* passing from supra-orbital ridge to the nostrils; frenal region fl vertical, consisting of two shields, the posterior by the largest. Two large supra-orbital shields on each side, the two surrounded, except in front, by small granular scales; between them in front is an elongately pentagonal vertical shield, with a central depressed groove; post-occipital shields large, separated by a row of small shields of very unequal size. Lower eyelid covered with small granular scales. 'Upper labials 8 or 9; of which six or seven are of moderate size, then a large sub-orbital shield, expanded above, and forming the lower part of the orbit. Lower labials 6; sub-mental shields 4 on each side, the hindmost about three-quarters the length of the other three together. Collar not very distinct, composed of about six larger scales, the central being the largest, passing at the extremities into the ordinary neck scales. Large ventral shields in six rows, with a smaller row at each side. A large pre-anal shield, surrounded by a ring of smaller ones. Femoral pores 18 in each thigh. Dorsal scales small, granular. Caudal scales oblong, strongly keeled. Hind legs long, the toe when laid forward almost reaches the end of the nose, the fore-foot laid back reaches three-quarters of the distance to the thigh.

A single individual was procured in the Anseba valley, where this lizard apparently abounded. Unfortunately no other specimens were taken, as I had confounded it with the next species. It closely allied to *Eremias Brenneri*, Peters (Monatsber. K. Preuss. Acad. 1869, p. 432); but differs in several points, especially in the number of supra-labial shields, the proportion of the sub-mental shields, and the greater length of the limbs. The colour also is very different.

12. A. boskianus, Fitz.

Dum. et Bibr. v. p. 278.

Common in Samhar. Two specimens collected ne Zulla.

13. Eupressis quinquetæniatus, Licht.

Scincus quinquetæniatus, Licht. Verz. Doubl. Mus. Berl. p. 103.
Eupressis Savignii, Dum. et Bibr. Erp. Gen. v. p. 677.

I obtained one large specimen at Suru, and fo smaller ones on the highlands, three of them from th stomach of a Secretary-bird. They differ greatly i markings, but Dr. Günther considers all to be varieti of the same.

14. E. Perrottetii, Dum. et Bib.

Dum. et Bibr. Erp. Gen. v. p. 669.
? *Tiliqua Burtoni*, Blyth, Jour. As. Soc. Beng.

This was obtained by Mr. Jesse at Wonber Harattib, i the Lebka valley. I did not procure a specimen. I su pect that *Tiliqua Burtoni* of Blyth from Somali-lan the type specimen of which in the Calcutta Museu has unfortunately been lost, may very possibly be th species.

15. Gongylus ocellatus, Forsk.

Lacerta occelata, Forsk. Desc. Anim. p. 13.
G. ocellatus, Dum. et Bibr. Erp. Gen. v. p. 616.

Several specimens, taken, with *Eupressis quinqueta niatus*, from the stomach of a Secretary bird shot a Ashangi. All are small.

ORDER *OPHIDIA.*

16. **Typhlops Eschrichtii,** Schlegel.

Schleg. Abbild. Amph. p. 37, pl. 32, figs. 13—16.
Ophthalmidion Eschritchtii, Dum. et Bibr. vi. p. 265.

I am indebted for a single specimen taken at Senafé to Capt. Sturt. It is small, measuring only 12 in. in length.

17. **Echis arenicola,** Boie.

Isis, 1827, p. 558.
E. varia, Reuss. Mus. Senkenb. ii. p. 160, t. vii. f. 2.

This viperine Snake was common in the camp at Zulla, individuals frequently being found about the tents, and it is surprising that no one suffered from its bite. All the specimens seen by me were small. I preserved two, one of which has 193 ventral shields.

18. **Dasypeltis abyssinicus,** Dum. et Bib.

Rachiodon abyssinus, Dumeril et Bibron, Erp. Gen. vii. p. 496, pl. 81, figs. 1 and 2.

A single specimen, quite young, only 12 in. long, was obtained at Senafé by Lieut. Sturt, to whom I am indebted for it. Dr. Günther informs me that he doubts if this species be distinct from *D. palmarum*. The tail measures 1¾ in. The colours are not so bright as in Dumeril and Bibron's figure.

19. **Boodon lemniscatum,** Dum. et Bibr.

Dumeril et Bibron, Erp. Gen. vii. p. 365.

I obtained two specimens, one at Ashangi, the other at Adabagi. The former, a male, measures 21 in., the latter, a female, 30 in., of which the tail is 4in. The male is much the darker in colour.

20. Homalosoma lutrix, L.

Coluber lutrix, L. Syst. Nat. ed. 12, i. p. 275.
Homalosoma lutrix, Dum. et Bibr. vii. p. 110.

A very young specimen, only 9 in. long, was take
Ashangi.

21. Bucephalus typus, Smith.

Zoological Journal, vii. p. 441.
B. capensis, Smith, Ill. Zool. South Afr. Rept. pl. 12.—Günthe
B. typus, Dum. et Bibr. Erp. Gen. vii. p. 877.

One specimen, only 22 in. long, was procured
Senafé; a larger one, which was captured on the Ans
measures 33 in.

22. Psammophis sibilans, L.

Coluber sibilans, L. Syst. Nat. ed. 12, p. 383.
Phammophis monoliger, Dum. et Bibr. vii. p. 891.

A single individual of this common African Tree Sn
was taken in the Anseba valley. It is 23 in. long.

ORDER *BATRACHIA*.

23. Pyxicephalus rugosus.

A single specimen found at Senafé.

24. Rana mascariensis, Dum. et Bibr.

Dum. et Bibr. Erp. Gen. viii. p. 350.

This Frog was common in the streams at Suru, an
Ain on the Lebka, both at low elevations, not exceed
2,000 feet above the sea.

25. **Dactylethra lævis,** Daud.

Bufo levis, Daud. Hist. Nat. Rain. p. 85, pl. 30, f. 1.; Hist. Rept. viii. p. 171.
Dactylethra capensis, Dum. et Bibr. viii. p. 765.

I obtained two specimens at Senafé.

26. **Bufo pantherinus,** Boie.

Dum. et Bibr. Erp. Gen. viii. p. 687.
B. arabicus, Rüpp. Atlas, t. iii. f. 2.
B. regularis, Reuss. Mus. Senck. i. p. 60.

This Toad abounded about Lake Ashangi and other places on the highlands. It is highly variable; some specimens being covered with small tubercles, others quite smooth. I also obtained some young specimens, apparently belonging to the same species, at Ain in the Lebka valley, only about 1,200 feet above the sea.

27. **Bufo,** sp. indet.

A single young Toad captured at Suru is too immature for determination. It appears to belong to a distinct species from the last.

CLASS PISCES.

I obtained but two species of Fish. The route taken by the army avoided all rivers, and in Lake Ashangi I was unable to capture anything, and only procured one specimen from the stomach of a Grebe. The fish taken are both Cyprinoids; I am indebted to Dr. Günther for their names.

1. Capoeta Dillonii, Cuv. et Val.

I preserved a skin of a Fish taken in a stream at Agula, which Dr. Günther is inclined to refer to this species, although it differs slightly from the description. The dorsal fin contains 3 spiny and 9 soft rays, whereas *C. Dillonii* is said to have only 1 spine. There are 32 scales on the lateral line.

2. Discognathus lamta, Hans Buch.

I obtained several specimens in the stream at Suru, and others were caught by Mr. Jesse in a small pool left in a watercourse at Amba, about twenty-five miles north of Massowa. These differ in no respect from specimens from Palestine in the British Museum. They all have the black mark at the base of the gill opening, although the lateral marks are less distinct than in Indian specimens. The scales on the lateral line are 33 to 34 in number.

The same Fish has been obtained in abundance by Lieut. Mockler at Lahej, near Aden, in a small stream which occurs there.

Singular to state, the single Fish procured at Lake Ashangi, though not in sufficiently good condition for accurate determination, appears also to belong to this species. It is of course possible that it may be a distinct form occurring on the highlands, but it is clearly very closely allied, if not identical.

MOLLUSCA.

I.

OCEANIC MOLLUSCA OBTAINED OFF THE S.E. COA OF ARABIA.

CLASS PTEROPODA.

1. *Hyalœa uncinata*, Rang.

Scarce.

2. *H. longirostris*, Lesueur.

Abundant.

3. *Spirialis trochiformis*, D'Orb.

Rare.

4. *Styliola corniformis*, D'Orb.

Not abundant.

CLASS GASTEROPODA.

5. *Litiopa bombyx*, Rang.

Not very common : attached to floating weed.

CLASS HETEROPODA.

6. *Ianthina fragilis*, Lam. (not Reeve).
Syn. *I. roseola*, Rv. and *I. affinis*, Rv.

Common: the variety is that called *I. roseola* Reeve, but it appears to be merely a variety of *fragi*

7. *I. globosa*, Swains.

Not rare: a variety with rather a high spire.

8. *I. bifida*, Nuttall.

Less common than the other two, but not rare. It is near *I. Vinsoni*, Deshayes.

9. *Atlanta Peronii*, Lesueur and Blainv.

II.

MARINE MOLLUSCA FROM ANNESLEY BAY.

Class GASTEROPODA.

Order *PROSOBRANCHIATA.*

Family MURICIDÆ.

1. *Murex anguliferus*, Lam.
2. *M. ternispina*, Lam.
3. *M. scolopax*, Dillwyn.
4. *M. margariticola*, Brod.
5. *Tritonidea rubiginosa*, Rv.

A small variety, with fine sculpture.

6. *Hemifusus paradisiacus*, Chem.

Family TRITONIDÆ.

7. *Persona cancellina*, Desh.
8. *Ranella tuberculata*, Brod.
9. *R. spinosa*, Lam.

Family BUCCINIDÆ.

10. *Nassa pullus*, L.

Very common.

11. *N. Kieneri.*
12. *N. plicatella*, A. Ad. var.

The sculpture a little more nodose, and the f rather less tumid than in the types from Mr. Cumi cabinet, now in the British Museum.

13. *N. marginulata* (?) Lam.

A very small form, approaching *N. delicata*, Rv.

FAMILY PURPURIDÆ.

14. *Purpura hippocastanum*, L.

The only species found. None of the usual ty allied to *P. persica* and *P. carinata* were observed.

15. *Sistrum elatum*, Krauss.
16. *S. anaxares*, Duclos.

FAMILY OLIVIDÆ.

17. *Oliva inflata*, Lam.

Very abundant.

18. *Ancillaria exigua*, Sow.

Rare.

FAMILY MITRIDÆ.

19. *Mitra amabilis*, Rv.
20. *M. pretiosa*, Rv.
21. *Columbella varians*, Sow.
22. *C. flava*, Brug.
23. *Engina mendicaria*, Lam.

FAMILY MARGINELLIDÆ.

24. *Marginella monilis*, L.

FAMILY NATICIDÆ.

25. *Natica mammilla*, L.
26. *N. melanostoma*, Gm.

FAMILY EULIMIDÆ.

27. *Leiostraca*, sp. nov.

This is closely allied to *L. pura*, A. Ad., but it has fewer whorls, and the mouth is differently shaped, the columella being straight instead of sinuate. The specimens were found parasitic on a species of *Scutella*.

FAMILY SOLARIIDÆ.

28. *Solarium perspectivum*, L.
Syn. *S. nobile*, Hinds.

FAMILY CONIDÆ.

29. *Conus arenatus*, Hwass.
30. *C. Adansoni*, Lam.

FAMILY TEREBRIDÆ.

31. *Terebra cinctella* (?), Desh.

Only one specimen found, which is in poor condition. It belongs either to the above, or a closely allied species,

32. *T. nassoides*, Hinds.

The plaits are less numerous than in the British Museum specimens, but this character is evidently variable.

FAMILY STROMBIDÆ.

33. *Strombus tricornis*, Martini.

Common about coral reefs. Several living specimens were washed up at Malkatto one day when the sea was rougher than usual.

34. *S. fasciatus*, Born.
35. *S. floridus*, Lam.
36. *S. elegans*, Sow.

37. *S. dentatus*, L.

38. *Rostellaria curvirostris*, Lam.

Common on sandy shore at Malkatto.

FAMILY CYPRÆIDÆ.

39. *Cypræa turdus*, L.

40. *Trivia oryza*, Lam.

FAMILY CERITHIIDÆ.

41. *Cerithum aspersum*, Desh.

42. *C. variegatum*, Quoy.

Very common.

43. *C. Adenense*, Rv.

Not rare.

44. *C. interstriatum*, Sow.

45. *C. Kochii*, Phil.

46. *C. bifasciatum*, Sow.

47. *C.* sp. nov.

A single specimen in poor condition.

48. *C. columna*, Sow.

49. *Tympanotonos Layardi*, Rv.

50. *T. fluviatile*, Pot. and Mich.

51. *Pyrazus palustris*, Brug.

Common amongst mangroves.

52. *Bittium*, sp. nov.

A single specimen.

53. *Triforis ruber*, Hinds.

54. *T. distinctus*, Desh.

55. *Fastigiella* (?) sp.

A single specimen in bad condition.

FAMILY CERITHIOPSIDÆ.

56. *Cerithiopsis*, sp.

Apparently new.

FAMILY LITTORINIDÆ.

57. *Littorina malaccana*, Phil.
58. *L. intermedia*, Phil.

FAMILY PLANAXIDÆ.

59. *Planaxis sulcata*, Born.
Syn. *P. undulata*, Lam.

Common.

FAMILY RISSOIDÆ.

60. *Rissoina myosoroides*, Recl.
61. *R. plicata*, A. Ad.
62. *R. media*, Schwartz, v. Mohr.
63. *R. d'Orbignyi*, A. Ad. var.
64. *R.* sp. nov.
65. *Alaba*, sp. nov.

FAMILY NERITIDÆ.

66. *Nerita polita*, L.

Very common.

67. *N. rudis*, Gray.

Common.

68. *N. albicella*, L.

Common.

FAMILY TROCHIDÆ.

69. *Tectus dentatus*, Forsk.
70. *T. noduliferus*, Lam.
71. *Eucheilus edentulus*, A. Ad.
72. *E. baccatus*, Küster.
73. *Trochus crebriliratus*, Jonas.
74. *Monodonta canalifera*, Lam.
75. *Gibbula*, sp. nov.

Near *G. adriatica*, Phil., but the spire is higher, and the sutures less impressed. It also approaches *G. leu-*

costicta, A. Ad., but the whorls are flatter, and spire higher.

76. *Gena*, sp. nov.

A peculiar carinate species.

FAMILY TURBINIDÆ.

77. *Turbo Chemnitzianus*, Rv.
78. *T.* sp.

I cannot find any name for this species; it is a s
form figured in the "Descr. de l'Égypte," pl. v. fig. 2

79. *T. coronatus*, Gmel.

Common.

FAMILY FISSURELLIDÆ.

80. *Fissurella cyathulum*, Rv.

FAMILY PATELLIDÆ.

81. *Patella rota*, Chem.

Common.

82. *Helcion*, sp.

A single young specimen.

FAMILY CHITONIDÆ.

83. *Chiton brevispinosus*, Rv.

Common.

84. *Ch. incurvatus*, Carp.

ORDER *OPISTHOBRANCHIATA.*

FAMILY BULLIDÆ.

85. *Bulla ampulla*, L.

ORDER *PULMONIFERA.*

FAMILY AURICULIDÆ.

86. *Melampus castaneus*, Muhlf.
87. *M. Massauensis*, Pfr.
88. *Plecotrema*, sp. nov.

It is usual to consider the *Auriculidæ* land-shells: this, however, is incorrect; they are no more land-shells than *Pyrazus* or *Littorina* are; the majority of them inhabit estuaries and mangrove swamps, others are littoral shells, like *Patella* or *Purpura.*

CLASS LAMELLIBRANCHIATA.

FAMILY GASTROCHÆNIDÆ.

89. *Rocellaria ovata*, Sow.

A Mazatlan species, but unmistakeably identical.

FAMILY CORBULIDÆ.

90. *Corbula crassa*, Hinds.

FAMILY MACTRIDÆ.

91. *Mactra semisulcata*, Rv.

FAMILY TELLINIDÆ.

92. *Asaphis deflorata*, L.
93. *Donax vittatus*, Lam.
    Syn. *D. trifasciatus*, Mawe.
94. *Tellina culter*, Hanley.
95. *T. carnea*, Bens.
96. *T. capsoides*, Lam.
97. *Strigilla Senegalensis*, Hanley.
98. *Paphia striata*, Chem.

FAMILY VENERIDÆ.

99. *Dosinia hepatica*, Sow.
100. *Chione nebulosa*, Lam.
101. *Circe Arabica*, Chem.

Common.

102. *C. pectinata*, L.
103. *C. corrugata*, Chem.
104. *Rupellaria macrophylla*, Desh.
105. *Petricola*, sp. nov.

FAMILY CARDIADÆ.

106. *Cardium rugosum*, Lam.

FAMILY CHAMIDÆ.

107. *Chama gryphoides*, Phil.
108. *C. iostoma*, Conrad.

FAMILY LUCINIDÆ.

109. *Lucina exasperata*, Rv.

FAMILY KELLIADÆ.

110. *Kellia*, sp. nov.

A new and peculiar milk-white shell.

FAMILY ASTARTIDÆ.

111. *Cardita sulcata*, Brug.

Perfectly identical with specimens from the terranean.

FAMILY MYTILIDÆ.

112. *Septifer Kraussi*, Dunker.
113. *Madiola hepatica*, Gould.
114. *M.* sp. nov.

A peculiar small species, with strong denticulatio

115. *Lithodomus Hanleyanus*, Rv.

FAMILY AVICULIDÆ.

116. *Melegrina margaritifera* (?), L.
117. *Avicula radiata*, Desh.
118. *A.* sp.

Perhaps a variety of the last.

119. *Malleus regula*, Forsk.

FAMILY ARCIDÆ.

120. *Arca imbricata*, Brug.
121. *A.* (*Barbatia*) *decussata*, Sow.
122. *A.* (*Scapharca*) *inæquivalvis*, Brug.
123. *A.* (*Anomalocardia*) *scapha*, Chem.
124. *Pectunculus roseus* (?), Rv.

FAMILY SPONDYLIDÆ.

125. *Spondylus*, sp.

I cannot discriminate the species of this genus.

126. *Plicatula imbricata*, Menke.

FAMILY OSTREIDÆ.

127. *O. mytiloides*, Lam.
128. *O.* sp.

On mangroves.

III.

FRESHWATER MOLLUSCA.

Of these but very few were obtained, as I had no opportunity of visiting the large rivers. For a complete account of the species of land and freshwater mollusca previously known to exist in Abyssinia, see V. Marten's "Malakozoologische Blätter" for 1865, vol. xii., and 1866, vol. xiii.

1. *Bythinia*, sp. nov (?).

Antalo. A single specimen only.

2. *Melania tuberculata*, Müll.

Stream at Ailat, Samhar, very little above the se level.

3. *Lymnea Natalensis*, Krauss.

Stream at Guna-Guna, on the highlands. Som specimens are precisely similar to those from Sout Africa ; others are rather more tumid.

A larger variety was obtained in the stream formin the head of the Haddas river, near Takonda.

4. *Physa contorta*, Mich.

Lake Ashangi. Specimens from the Nile in th British Museum have a smaller mouth. Others fro Natal are very similar in form.

5. *Physa*, sp.

Stream on Wadela plateau, at about 9,500 feet nea Yasendyé. The two specimens obtained are small, an probably immature. They resemble in form *P. fo tinalis*, but are not smooth like that species, nor hav they any internal labiation. They may possibly be onl an elongated variety of *P. contorta.*

6. *Ancylus fluviatilis*, Müll.

Streams, Guna Guna, &c., Tigré.

7. *A.* sp.

Stream near Mai Wahiz, Tigré. Four small specime found. They closely resemble some varieties of t Indian *A. verruca*, Bens.

8. *Planorbis Rüppelli*, Dunker.

Streams on highlands of Tigré. Common. The peculiar keel near the suture described by Dunker is wanting in my specimens, and is probably accidental. The mouth is very oblique, less so, however, than in the Natal species, *L. Pfeifferi*, Krauss.

9. *P.* sp. nov.

Lake Ashangi. Dead specimens found on the shore with *Physa contorta.* This is very near the Indian *P. compressus*, but the umbilicus is more open, and the keel more basal and less median. It is very near *P. Natalensis* also, but differs in the mouth being sinuate near the periphery, and less arcuate above, in the lower surface being more convex, and the shell more compressed.

10. *P. Natalensis* (?) Krauss.

Stream on Wadela plateau. Only a single specimen was obtained, which may be the above species; the whorls appear rather narrower and less angulate at the periphery.

IV.

LAND MOLLUSCA.

Of these also but a very meagre series was obtained, the country being evidently excessively poor in land-shells. No *Cyclostomacea* have ever been found in this part of Africa, and the large *Achatinæ* and their allies were entirely wanting in the country traversed, although they appear to have been found further to the sout west, near Lake Dembea.

1. *Helix Darnaudi*, Pfr.

Common throughout Northern Tigré, from abo 3,000 to 8,000 feet above the sea. I found it at Und Wells, Senafé, Takonda, Adigrat, and in the Ansel valley.

2. *H.* sp. nov.

An ally of *H. pisana*, and still more closely allied *H. subrostrata*, Fer. It is distinguished from the form in its much more open umbilicus, from the latter in bein smaller and less solid. Specimens, undistinguishab from those collected by me in Abyssinia, were broug from Persia by Mr. Loftus, and are in the British Museu collection.

This shell abounded in the limestone tract north Antalo, the aloes and some of the bushes being frequent covered with it.

3. *H. cryophila*, V. Martens.

Occasionally found in the mountainous country Lasta near Meshek, Lat, &c. It has four whorls, and t last appears to be rather less broad than would appe to be the case with the types described by Von Marten but there is no essential difference.

A single worn specimen from Adigrat is higher proportion to the diameter, and may belong to a distin species.

4. *H. rivularis* (?) Krauss.

Agula, Tigré. This agrees very well, except that it very finely costulate throughout rather than striated. The measurements are identical.

5. *Zonites*, sp.

Meshek. A single specimen only. It is very close to *H. egenula*, Mor., from Senegal.

6. *Vitrina Rüppelliana*, Pfr.
Syn. *V. Darnaudi*, Pfr.

Common in Northern Tigré about Takonda, Senafé, and Adigrat, above 6,000 feet. *V. Darnaudi* appears to be only a variety of *V. Rüppelliana.* I obtained both, and intermediate forms as well.

7. *V. Abyssinica*, Pfr.

Takonda. I only found this shell once. My specimens are a little more angulate at the periphery than the type.

8. *V.* sp. nov.

Ashangi. Found alive abundantly amongst long grass. The animal is a true *Vitrina* and not a *Helicarion*, having no mucus-pore at the end of the tail.

Two or three specimens found at Lat and Antalo differ somewhat from this form, but may be varieties only.

9. *Succinea debilis*, Mor.
? *S. Pfeifferi*, ex Abyssinia, auct.

Ashangi. There are larger specimens in the British Museum of the same shell, also from Abyssinia, labelled *S. Pfeifferi.* It differs, however, from all European forms of that species by its much smaller spire and larger mouth.

10. *S. amphibia*, Drap. var.

Adigrat and Antalo. The mouth is a little round than in European specimens, but there appears to be important distinction.

11. *Bulimus Abyssinicus*, Rüpp.

Hadoda near Zulla, and Keren in Bogos. I found b a single specimen in each place.

12. *B. Olivieri*, Pfr.

Scarce in Tigré. Common further south above 6,00 feet. I found it first near Undul, but it was scarc About Ashangi and throughout the Lasta hills it wa the commonest shell met with, and it is the finest an handsomest land-shell found by me in Abyssinia. specimen from the Wadela plateau is greatly elongate There is considerable variation in size.

13. *Stenogyra gracilis* (?) Hutton.

Adabagi, Tigré. A single immature specimen of th or some closely allied species.

14. *Pupa cœnopicta*, Hutt.
Syn. *P. Sennaarensis*, Pfr.
P. Senegalensis, Mor.

Meshek. I was surprised at finding this commo Indian shell on the Abyssinian highlands. The spec mens were quite indistinguishable from some India examples, and there can, I think, be no question th the two forms described by Pfeiffer and Morelet are th same.

15. *P.* sp. nov.

Senafé, Adigrat, Agula, and Meshek. A common form in Tigré. I can find nothing like it described. The nearest known form is perhaps *P. doliolum*.

16. *P. fontana* (?) Krauss.

Same localities as last, and very abundant. It has a vertical groove behind the lip, and an indentation corresponding to the lower tooth of the dextral margin, neither of which is described in the South African shell, otherwise it agrees admirably.

17. *P.* sp. nov.

Agula, and near Takonda, Tigré. Very near *P. umbilicata*, Drap., but there is one whorl less and the aperture is rounder, not being pointed below.

18. *Vertigo*, sp. nov.

Agula, rare. A small reversed species, of which I found only two specimens.

19. *Clausilia Sennaarensis*, Pfr.

Near Lat, south of Ashangi. Only an immature specimen, but apparently belonging to this species, was found.

20. *Ennea*, sp. nov.

Meshek, Ashangi, Lat, Wandaj pass. Nowhere common. This is allied to *E. crystallum*, Mor., but is a much longer and more slender shell, with fewer whorls.

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